The Illustrated Dictionary of Gardening

An Encyclopædia of Horticulture.

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THE

ILLUSTRATED

DICTIONARY OF GARDENING,

A PRACTICAL AND SCIENTIFIC

Encyclopædia of Horticulture

FOR

GARDENERS AND BOTANISTS.

EDITED BY

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Curator, Royal Botanic Gardens, Kew.

Assisted by Professor J. W. H. TRAIL, A.M., M.D., F.L.S., in the parts relating to Insects, Fungi, Plant Structure, Horticultural Chem stry, &c.; and J. GARRETT in the Fruit, Vegetable, and General Garden Work portions.

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PREFACE TO VOL. III.

THE First and Second Volumes of "THE DICTIONARY OF GARDENING" have been so favourably received by the horticultural and botanical public, that both the Publisher and Editor can congratulate themselves on the success of their work, and confidently hope that the present Volume will be found equal in merit, or even superior, to those which have preceded it. No efforts have been spared to render the work the standard of reference on Garden Botany, and on horticultural matters generally. The Editor has, in all cases, tried to bring up the different subjects to our present state of knowledge, and a large number of errors which occur in other gardening works are, in this, corrected.

It would have been impossible to succeed so far in this if the resources of such an establishment as Kew had not been available. To the help so frequently and generously accorded by the Editor's colleagues and by friendly "outsiders," the value of the DICTIONARY OF GARDENING is doubtless to a considerable extent due.

In the vast majority of cases, the limitation of genera is in accordance with the "Genera Plantarum" of Bentham and Hooker. This arrangement will, it is hoped, do something to clear up the present very confused state of garden nomenclature, and cause some degree of order and uniformity to be attained. Wherever it has been possible to do so, the purely garden names—*i.e.*, those which occur in no *botanical* works—have been corrected, and references given to the botanical names. As a

matter of course, a number still remain in doubt; as the plants produce flowers, however, they will, if practicable, be determined, and the results given at the end of Vol. IV.

Mr. J. Garrett, as in the First and Second Volumes, has undertaken the preparation of those portions relating to Fruit and Vegetable Culture, Florists' Flowers, and General Gardening Work.

Prof. J. W. H. Trail, M.D., F.L.S., &c., has written the articles on Fungi, Insects, Plant Diseases, Plant Structure, Horticultural Chemistry, Soils, &c.

The Rev. P. W. Myles, B.A., has continued to work out and check off the derivations of the generic names, a task which very frequently demands no little labour.

GEORGE NICHOLSON, A.L.S.,

Curator, Royal Gardens, Kew.

Royal Gardens, Kew.

REFERENCE TO ILLUSTRATIONS OF PLANTS OTHER THAN THOSE FIGURED IN THIS WORK.

IT has been suggested, by an eminent Authority, that many readers would be glad to be informed where reliable Illustrations could be found of those Plants which are not figured in this Work. To meet this want, references to the Figures in Standard Authorities have been given, the titles of the Works referred to being, for economy of space, abbreviated as follows:

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F. d. S. .. .. La Flore des Serres et des Jardins de l'Europe. Gand., 1845-83. 23 vols. 8vo.

Fl. Ment. .. Moggridge (J. T.). Contributions to the Flora of Mentone. London, 1864-8.

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F. M. .. .. Floral Magazine. London, 1861-71, 8vo. Series II. 1872-81, 4to.

F. & P. .. .. Florist and Pomologist. London, 1868-84. 8vo.

G. C. .. .. The Gardeners' Chronicle and Agricultural Gazette. London, 1841-65. 4to.

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G. & F... .. Garden and Forest. New York, 1888, &c. 4to.*

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M. A. S. .. Salm-Dyck. Monographia Generum Aloes et Mesembryanthemi. Bonnæ, 1836-63. 4to.

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P. F. G. .. *See* L. & P. F. G.

P. M. B. .. Paxton (J.). Magazine of Botany. London, 1834-49. 16 vols. 8vo

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Sw. Ger. .. Sweet (Robert). Geraniaceæ, the Natural Order of Gerania. London, 1828-30. 8vo.

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* Is still in course of publication.

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DICTIONARY OF GARDENING,

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The following are the Abbreviations used:—*fl.* flowers; *fr.* fruit; *l.* leaves; *h.* height; *deg.* degrees; *rhiz.* rhizomes; *cau.* caudex; *sti.* stipes.

The Asterisks (*) indicate plants that are especially good or distinct.

PACHIDENDRON. Included under **Aloe** (which *see*).

PACHIRA (the native name of the trees in Guiana). Syn. *Carolinea.* Ord. *Malvaceæ.* A genus comprising about fifteen species of very handsome, dense-foliaged, stove trees, inhabiting tropical America. Calyx cup-shaped, truncate or obsoletely toothed; petals white or reddish, oblong or linear, occasionally 6in. to 12in. long, often tomentose without; peduncles axillary, one-flowered, bi- or tri-bracteolate. Leaves digitate, with three to nine entire leaflets. The species (of which the four here described are the best) are commonly known as Carolineas; they thrive best in a rich, loamy soil. Propagated by large cuttings, taken off at a joint, with the leaves intact, and inserted in sand, under a bell glass, in heat.

P. alba (white). *fl.* white, strong-scented, disposed at the tops of the branches; calyx flowing with honey. July. *h.* 20ft. Brazil, 1817. A magnificent tree. (B. M. 4508.)

P. insignis (remarkable).* *fl.* pale red, downy without and smooth within; petals erect, spreading at the top; anthers white; style red. July. *l.*, leaflets five to seven, obovate-oblong. *h.* 60ft. West Indies, &c., 1796. (L. B. C. 1004, under name of *Carolinea insignis.*)

P. macrocarpa (large-fruited). *fl.* large; petals very long, white, silky outside; tube of calyx short, truncate, glandular at base; stamens yellowish-red, equal to the petals. June. *l.*, leaflets seven to eleven, oblong-obovate, cuneated at the base, acuminated at top. Mexico, 1840. Small tree. (B. M. 4549.)

P. minor (smaller). *fl.*, petals green, erect; filaments red; anthers yellow. July. *l.*, leaflets seven, elliptical-oblong, acute at both ends. *h.* 10ft. Mexico, 1798. (B. M. 1412, under name of *Carolinea minor.*)

PACHOULI. *See* **Patchouli.**

PACHYCHILUS. A synonym of **Pachystoma** (which *see*).

PACHYDERIS. Included under *Nephrodium.*

PACHYLOMA. Included under *Hymenophyllum.*

PACHYLOPHUS. Included under *Œnothera.*

PACHYNE. A synonym of **Phaius** (which *see*).

PACHYNEMA (from *pachys*, thick, and *nema*, a filament; in allusion to the thick filaments). Ord. *Dilleniaceæ.* A genus consisting of only four species of

Pachynema—*continued.*

Australian, suffruticose, often glabrous herbs. Flowers yellow; sepals and petals five; pedicels lateral, short, recurved. Leaves reduced to minute scales, or rarely a few at base of the stem, trifid. *P. complanatum*—the only species introduced—is more curious than beautiful.

PACHYNEURUM. Included under *Parrya.*

PACHYPHYLLUM (from *pachys*, thick, and *phyllon*, a leaf; referring to the consistence of the leaves). Ord. *Orchideæ.* A small genus of about six or seven species of stove, epiphytal orchids, natives of the Andes of South America. Flowers inconspicuous, bifariously disposed on short, axillary, few-flowered spikes, rarely reduced to one flower; the conniving perianth with a free, undivided, sessile lip, having a single tubercle at its base, and two at its apex, a petaloid column, and two pollen masses. Leaves thick and fleshy, arranged in two ranks, and overlapping each other. For culture, *see* **Maxillaria.** The two species introduced—*P. distichum* and *P. procumbens*—are of botanical interest only.

PACHYPHYTUM. Included under **Cotyledon** (which *see*).

PACHYPODIUM (from *pachys*, thick, and *pous*, *podos*, a foot; in reference to the thick, fleshy roots). Syn. *Belonites.* Ord. *Apocynaceæ.* A genus comprising about five species of pretty, often fleshy, stove shrubs, inhabiting South Africa and Madagascar. The species usually seen under cultivation is the one here described. It thrives best in a mixture of lime rubbish, sand, and loam. Propagated by cuttings, inserted in sand, under a hand glass. Water should be sparingly applied to Pachypodiums while in a growing state.

P. succulentum (succulent).* *fl.*, corolla red outside, and whitish on the upper surface of the limb, tinged with red. June to November. *l.* oblong, tomentose beneath, glabrous above. Stem tuberous at base. Cape of Good Hope, 1813. (B. M. 5543; B. R. 1321; L. B. C. 1676, under name of *P. tuberosum.*)

PACHYRHIZUS (from *pachys*, thick, and *rhiza*, a root; alluding to the thick, tuberous roots of the plants). Syns. *Cacara* and *Tæniocarpum.* Ord. *Leguminosæ.* A

Pachyrhizus—*continued.*

genus comprising a couple of species of tall, stove, twining herbs, one a native of Mexico, and the other widely spread throughout the warmer parts of Asia and America, and occurring also in tropical Africa. Flowers violet-blue, in clusters, on large, glandular knobs; standard broad, obovate; keel incurved, obtuse. Leaves pinnate, trifoliolate, stipellate; leaflets often angular or sinuate-lobed. Stems rising from large, tuberous roots. *L. angulatus*, the species introduced to cultivation, thrives in a light, rich soil. Propagated by cuttings, inserted in sand, under a glass; by the tubers of the roots; or by seeds.

P. angulatus (angular). *fl.* purple, in long racemes. July. *l.*, leaflets angular, sharp-toothed. Tropics, 1781. Cultivated in the tropics for its large, Turnip-like, tuberous roots, which are eaten either raw or boiled.

PACHYSA. Included under *Erica.*

PACHYSANDRA (from *pachys*, thick, and *aner*, *andros*, a stamen; referring to the thickness of the stamens). ORD. *Euphorbiaceæ.* A small genus (two species) of hardy, or nearly hardy, herbaceous plants, procumbent, or rooting at base; one is from North America, and the other a native of Japan. Flowers monœcious, apetalous, solitary and alternate under the bracts, sessile, or shortly pedicellate. Leaves alternate, stalked, rather broad, deeply toothed or rarely entire, triplinerved. The species are of more botanical than horticultural interest. They thrive in common soil, and may be increased by division of the roots.

P. coriacea (Leathery). A synonym of *Sarcococca saligna coriacea.*

P. procumbens (procumbent). *fl.* white; spikes few, many-flowered, borne along the base of the stem. March. *l.* several, on slender petioles, approximate at the summit of the stem. Stems 6in. to 9in. long. North America, 1800. (B. M. 1964; B. R. 33; L. B. C. 910.)

P. terminalis (terminal). *l.* broadly cuneate-obovate, coriaceous, green, with whitish marginal variegation, crowded towards the ends of the shoots. Japan, 1882. Plant of low stature.

PACHYSTACHYS. Included under *Jacobinia.*

PACHYSTIGMA (of Hooker). A synonym of **Peltostigma** (which *see*).

PACHYSTIMA (from *pachys*, thick, and *stigma*; in allusion to the stout form of that organ). SYN. *Oreophila.* ORD. *Celastrineæ.* A genus of small, slightly branched, highly glabrous, hardy, evergreen shrubs, requiring culture similar to **Myginda** (which *see*).

P. Canbyi (Canby's). *fl.* reddish, small; petals oblong-obovate; style very short; pedicel filiform, elongated. Summer. *l.* oblong-linear, slightly denticulate. Stems surculosely creeping. Mountains of Virginia. A pretty species.

P. Myrsinites (Myrsine-like). *fl.* greenish, axillary, solitary or fascicled; calyx with a short tube and four rounded lobes; petals four, rounded, spreading; stamens four, inserted below the disk. June. *l.* opposite, very shortly petiolate, small, coriaceous, serrated or entire; stipules minute, deciduous. *h.* 1ft to 2ft. Mountains of North-west America, 1818. SYN. *Myginda myrtifolia* (H. F. B. A. i. 41).

PACHYSTOMA (from *pachys*, thick, and *stoma*, a mouth; alluding to the thick lip). SYN. *Pachychilus.* Including *Apaturia* and *Ipsea.* ORD. *Orchideæ.* A genus comprising about ten species of stove, terrestrial orchids, with erect, nodose rhizomes and simple stems; one is tropical African, and the rest are natives of the East Indies and the Malayan Archipelago. Flowers mediocre or rather large, pendulous, in a simple raceme; sepals connivent, the lateral one sometimes very shortly adnate to the base of the column; petals similar to the posterior sepals, but slightly smaller; lip affixed to, or adnate to the base of, the column, the lateral lobes oblong and erect, the middle one short. Leaves, for the most part, wanting; but the pseudo-bulbs sometimes at length bear two or three leaves. For culture, *see* **Catasetum.** The species introduced are described below.

P. speciosum (showy). *fl.* yellow, showy, usually solitary, sometimes twin, very sweetly scented; sepals nearly 2in. long, oblong, lateral ones connate with the base of the column; petals slightly narrower, obtuse; middle segment of lip oblong, obtuse, lateral ones broad, acute; scape purple, 1ft. to 1½ft. high. Winter. *l.* twin, sheathing at base, narrow-ensiform. Root succulent. Ceylon. (B. M. 5701, under name of *Ipsea speciosa.*)

P. Thomsonianum (Thomson's).* *fl.*, sepals and petals white, beautifully shining, as if varnished; lip trifid, bright purple; side laciniæ and column light greenish, striped or blotched with brown; peduncle long, velvety green, bearing a raceme of two or more large blossoms. Autumn. *l.* petiolate, oblong-acuminate. Rhizome trailing, bearing roundish, depressed, sulcate pseudo-bulbs. *h.* 6in. West Tropical Africa, 1879. (B. M. 6471.)

PACKING. There are few large gardens from which more or less of the produce has not to be sent on a journey, at least, during some part of the year; and the practice of sending small boxes of flowers or fruit has now become common amongst persons with but limited means at command. On the system of Packing adopted, the condition in which consignments reach their destination very materially depends, be they composed of plants, flowers, or fruits; consequently, it is important that due precaution should always be taken to prevent the contents of packages being rendered useless in transit, because of their being improperly or insecurely packed. The system of Packing will depend very much on the length of journey to which the articles have to be subjected, the sort of article, and the mode of conveyance. References here will only be possible in somewhat general terms; but these may be sufficient, if the principal subjects transmitted are referred to, for providing such rules, or, rather, suggestions, as may be necessary. One important condition that may be said always to apply, is Packing so that the contents cannot move about inside their covering, no matter of what it may consist. Boxes or hampers should be of a size to properly hold what is intended without crushing; but should they, in any case, be rather large, the spare room must be filled with packing material, to prevent friction, and the consequent injury that must ensue. This rule is specially important in reference to ripe or tender-skinned fruits; but it applies with almost equal force to horticultural products of every description.

Plants. Packing of plants is much more extensively the work of nurserymen than of private gardeners, as it forms part of their trade. It is essential that consignments reach their destination with as little breakage as possible; consequently, men are, in all large firms, kept purposely for this work. The plans adopted vary with plants of different sorts and sizes, some requiring more protection than others. Round, matted baskets are largely used, as they are conveniently adapted for holding plants of different heights. Each of the latter should be securely staked, and, if necessary, covered with tissue paper, the ball being kept intact by tying some moss from above it to the pot with matting or soft string. Small plants with good roots are usually quite safe, if taken from the pots and tied up in moss, and the package is, in consequence, rendered of less weight. These would, more properly, be placed in boxes, or covered hampers, so that shifting about would be impossible when once the lid was fastened. Another plan is to use paper flower-pots, which are manufactured and sold for the purpose. These are strong, made of different sizes, and are always ready for use. The plant is taken from its ordinary pot, and placed in a paper one of similar dimensions, which is provided with flaps at the top for turning over the ball. In this way, a large number of small plants may be placed in a comparatively small hamper, and the work of Packing proceeds with rapidity. When Packing round or flat-covered hampers, it is advisable to arrange the plants as much as possible with their tops towards the centre, and use sufficient packing material to keep them firm in position, the greater part of the balls of earth being thus situated

Packing—*continued.*

near the outside. Plants packed in matted baskets are usually stood upright, string being tied in both directions across the top, to keep each pot in its proper position. Living plants are usually sent to, and received from, foreign countries, in Wardian cases. Packing is here, again, an important part of the undertaking, as on it very much of the success frequently depends. The pots, in this case, should be placed as near each other as possible, and the space between them well filled in with fine loam. Afterwards, narrow strips of wood, of a suitable size, should be laid crossways, and securely nailed to ledges on the sides of the case. Large quantities of plants, such as Orchids, Bromeliads, &c., which live a long time without moisture, are successfully imported in strong packing-cases of ordinary make, bound with hoop iron.

Flowers. With these, the private gardener has much to do, particularly throughout the summer, as large quantities have to be transmitted frequently, at long distances, to meet the customary demand. With increased facilities for sending small parcels, amateurs and cottagers are also enabled to favour their less fortunate friends with flowers whenever they are sufficiently plentiful. Here, too, the condition in which flowers arrive at their destination, depends very materially on the method of Packing adopted. It is obvious that if flowers, which should travel perfectly well when properly packed, arrive in a useless state, a great waste of material is effected, and disappointment caused, that, with ordinary care, might have been prevented. Flowers that are intended for travelling are invariably all the better for being cut at least a few hours previous to being packed, and placed in water. In summer, nothing should be cut for this purpose when the sun is shining, so as to cause the least sign of flagging. Evening, or, better still, early morning, should be the time chosen. Boxes, sufficiently strong, and proportionate in size to the quantity it is intended to send, should always be used; baskets are not satisfactory, as they allow so much evaporation, and do not prevent the evil influences from outside, either of heat or cold. Different flowers vary considerably in respect of the amount of pressure they will bear. The aim should be, in all cases, to completely fill the space up to the lid, and thus prevent the contents from shaking about. Should the flowers not be sufficient to do this, clean, damp moss may be placed in the bottom, or amongst them; but a box of the proper size is preferable. Cotton wool, so often placed amongst flowers, is not to be recommended, on account of its absorbent nature. Supposing mixed flowers are to be packed together, all the heavier ones should be placed at the bottom, and others carefully arranged above them. A little light fern laid over the top, then a double sheet of tissue paper, will prepare the way for the lid, which will then lightly press everything into its place without injury. Such quickly-injured flowers as Eucharis, Gardenias, &c., where a quantity have to be packed, should be provided with shallow boxes, just deep enough for carrying single specimens. These should be laid nearly close together, and held in position with moss slightly damped, tissue paper being then put over the top, beneath the lid. Some envelop each flower in soft paper separately; but this takes up more space, and, if they travel safely, unpacking cannot be so readily accomplished. Choice bouquets, wreaths, &c., should have special boxes provided for them, in which they can be fixed, so that shifting about is an impossibility. Boxes intended for carrying flowers through the post are best made of stout tin, strong enough to withstand the stamping process, as these are found to preserve their contents fresher than any others. If cardboard boxes are used, they should be provided with a lip, or flap, at the end, to which the stamps should be affixed. Tin boxes, of various sizes, are

Packing—*continued.*

specially prepared to meet postal requirements, and their general use for flowers is recommended. Careful and close Packing is here specially an essential, as small parcels have to withstand a deal of more or less rough usage before reaching their destination.

Fruits. Besides despatching supplies of fruit, to meet family requirements, large quantities have also to be sent from various places to market, and the condition in which such consignments arrive greatly affects their value. To the system of Packing much relating to success or failure may generally be attributed, although the condition of many fruits, at the time they are packed, must not be overlooked. Such soft-skinned subjects as Peaches, Nectarines, Figs, Strawberries, &c., require most careful handling, and will not travel satisfactorily in an over-ripe state. It becomes necessary, therefore, to gather them for Packing before they are fully ripe. This, unfortunately, detracts from their quality very considerably, but it is unavoidable where the results of a railway journey are to be taken into consideration. With Grapes, it is important that their bloom should be, as much as possible, preserved. With this end in view, the bunches are frequently packed close together, in moderately deep boxes or baskets, with an inside lining, on the bottom and around the sides, of soft, dry moss, covered with tissue paper. If provision can be made for keeping the box or basket upright throughout its journey, there is no need of putting anything beneath the lid. If this cannot be insured, similar paper, and a layer of moss, should be used, as on the the sides, for filling the vacant space; but this is almost certain to destroy more or less bloom. The bunches should be close enough together in the space to prevent rubbing or shifting about. Peaches, Nectarines, and Figs, must not be over-ripe, or their skins are sure to get bruised in transit. These fruits should be packed in boxes only deep enough to take one layer. Each fruit should be carefully wrapped in tissue paper, and sometimes it becomes necessary to have a thin band of cotton wool in addition. Figs are best packed in Vine leaves, without paper or cotton wool. Boxes about 3½in. or 4in. deep are most suitable, as these afford space for a layer of dry moss in the bottom, which acts as a bed; and if the fruits do not fill up, a sheet of tissue paper, and a little more moss or cotton wool above it, should be placed beneath the lid. Strawberries are best packed in boxes holding only single layers; 2in. deep is sufficient. A quantity of soft leaves should be gathered with the fruits, or from spare plants, and allowed to wither a little. In proceeding to pack, a leaf should be put round each fruit, which should then be placed in the box, one after the other, until the space is filled. Sufficient leaves are then laid over the top to fill up to the lid. All leaves used must be dry on the surface, otherwise they will injure the fruit. Apricots and Plums may be packed like Peaches, but they are not so delicate, and suffer less readily. Cherries travel well, when not too ripe, by being simply laid close together, in very shallow boxes. When it is necessary to preserve the bloom on Plums, they may be similarly treated.

PADIA. A synonym of **Oryza** (which *see*).

PADUS. *See* **Cerasus Padus.**

PÆDERIA (from *pædor*, an offensive smell; referring to the rank odour of *P. fœtida*). SYN. *Hondbessen.* ORD. *Rubiaceæ.* A small genus (five or six species) of stove, climbing shrubs, with twining stems, natives of tropical Asia, and one Brazilian. Flowers small, disposed in loose, two or three-forked cymes, produced either from the axils of the leaves or at the ends of the branches; calyx persistent, four or five-toothed; corolla tubular or funnel-shaped, hairy inside; limb of four or five spreading lobes. Fruit a small berry. Leaves opposite, rarely

Pæderia—*continued.*

ternately whorled, membranous, petiolate. The undermentioned species (the only one yet introduced) thrives in a compost of sandy loam and leaf mould. Propagated, in summer, by cuttings, inserted in sand, under a glass.

P. fœtida (stinking). Chinese Fever Plant. *fl.* deep pink, numerous; panicles axillary, opposite, short, rarely terminal. May. *fr.* broadly elliptic, compressed, polished. *l.* oblong or lanceolate, cordate at the base. Tropical Asia, &c., 1806. All parts of this plant emit a most offensive odour when bruised; the stems yield a tough, fine fibre, and the Hindoos use the roots as an emetic.

PÆDEROTA (from *Paideros*, a name applied by the ancients to a species of *Acanthus*). ORD. *Scrophularineæ*. A genus comprising only a couple of species of pretty, dwarf, hardy, perennial herbs, inhabiting the mountains of Central and Eastern Europe. Flowers yellow or blue, alternate, very shortly pedicellate, disposed in dense, terminal spikes; calyx of five narrow segments; corolla with a cylindrical tube and a sub-bilabiate limb, the upper lobe of which is entire, and the lower one three-parted. Leaves opposite, toothed or incised. The species, which are usually treated as annuals by gardeners, require a dry, airy situation, and a light sandy soil, or a compost of equal parts peat, loam, and sand. Increased by seeds.

P. Ageria (Ageria). *fl.* yellow; corolla nearly ½in. long, with erect segments; spikes short, compact. May. *l.* all acute; lower ones ovate; middle ones 1½in. long, almost 1in. broad; upper ones longer and narrower-lanceolate, cut-serrate. *h.* 6in. to 12in. 1824. Plant puberulous.

P. Bonarota (Bonarota). *fl.* blue; corolla ½in. long, with somewhat spreading segments; spikes compact, globose or oblong, 1in. to 1½in. long. May. *l.*, lower ones orbiculate; upper ones ovate or lanceolate, serrated or cut. *h.* 4in. to 6in. 1818. Plant pilose. (J. F. A. app. 39.)

PÆONIA (the old Greek name used by Theophrastus, and said to be so named after the physician Pæon, who was the first to employ the plant medicinally). Pæony, Peony, or Piony. ORD. *Ranunculaceæ*. A well-known genus of mostly hardy herbs, with a root-like, perennial caudex, or a branched, more or less woody stem; they are natives of Europe or temperate Asia, North-west America, and China. Flowers purple, white, or red, showy; sepals five, herbaceous, persistent; petals five to ten, conspicuous, broad, not pitted.

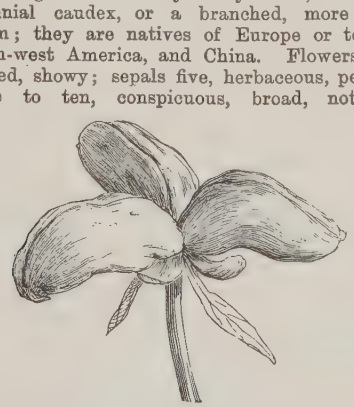


FIG. 1. FOLLICLES OF PÆONIA.

Carpels two to five; follicles dehiscent (see Fig. 1); seeds large, with fleshy albumen. Leaves alternate, ample, pinnately dissected or decompound. Mr. Baker, in the opening remarks of his admirable synopsis of the genus, which appeared in the "Gardeners' Chronicle" for 1884, says: "To-day we know about two dozen that may be considered as botanical species or sub-species. Under each of these, if brought into cultivation, there is scope for a large number of varieties, distinct from a horticultural point of view. Probably, each would vary widely in the colouring of the flower. In *P. Moutan*, *P. albiflora*, and *P. officinalis*, which are the best known, there is red in every shade, from crimson graduating down to pink, and also pure white. Doubling may take place in any species to a greater or lesser extent by petalody of the very numerous stamens. In flowers so large as Pæonies, these changes are very conspicuous. The following is the best classification and enumeration of the forms which I am able to give; but *Pæonia*, like its neighbours, *Aquilegia*, *Aconitum*, and *Delphinium*, is what botanists call a critical genus, and the leading specific types are linked together by many intermediate connecting stages:

Pæonia—*continued.*

Sub-genus I. Shrubby.

Disk enveloping the base of the carpels.

P. Moutan.

Sub-genus II. Herbaceous.

Disk not produced to envelop the base of the carpels.

GROUP I. Follicles glabrous.

P. albiflora, P. Brownii, P. Cambessedesii, P. coriacea, P. humilis, P. leiocarpa, P. microcarpa, P. obovata, P. Wittmanniana.

GROUP II. Follicles tomentose, erect or slightly spreading.

P. anomala, P. Emodi, P. lobata, P. mollis, P. officinalis, P. paradoxa, P. peregrina, P. tenuifolia.

GROUP III. Follicles tomentose, spreading stellately when mature.

P. arietina, P. Broteri, P. corallina, P. cretica, P. decora, P. Russi, P. triternata (P. daurica)."

All the species described here may be looked upon as hardy in Britain. In the South of England, *P. Moutan* is apt to commence growth too early, and its young shoots are frequently damaged by frosts. To obviate this, light shelter, such as that afforded by a mat, &c., is necessary, during frosty weather, in spring. In some places in the north of England, no shelter is needed. The species described below are those which are, or have been, grown in this country; the names of the principal varieties are appended.

Cultivation. There are two distinct sections of Pæonies in general cultivation, both of which are exceedingly ornamental and useful for outdoor garden decoration. The Moutan, or Tree, Pæony is a sub-shrubby plant, and all the numerous varieties belonging to it are classed under its name. The other section is that of the Herbaceous Pæony, the representatives of which annually form flower-stems that also die down each year. Pæonies of any sort prefer a rich, deep soil, which should be well trenched previous to planting, and have some rotten manure incorporated. A top-dressing of the latter should also be given, and manure-water in summer is beneficial when growth is being made. Herbaceous varieties succeed in almost any position, and, when in flower, are very effective and showy subjects wherever employed. On this account, they are specially recommended for the front part of large shrubberies and plantations, and for wide, mixed borders; they may also be planted in beds by themselves, preferably in positions where an effect from a distance is that desired. Tree, or Moutan, Pæonies very frequently suffer outside from the effects of spring frosts on the tender shoots. By affording too much shelter during winter, this result has, at times, been encouraged by the plants being rendered more tender than they otherwise would be. Tree Pæonies do not succeed, or flower so well, in this country as on the Continent; the hotter summers of the latter being more favourable to their proper ripening, and early spring frosts being less destructive. A partially-sheltered situation should be selected for the plants of this section, on a lawn where some temporary covering can be used in spring. A mulching of manure over the surface soil in summer is of great help, by affording nutriment, and also preventing evaporation. Tree Pæonies may also be grown in pots for flowering under

Pæonia—*continued.*

glass early in the season; they may be gradually forced to flower in February; but this renders them useless for a similar purpose for some two or three years afterwards. To maintain an annual exhibition indoors, three sets of plants should therefore be provided, one being introduced every third year. In pots, it is almost impossible to provide a too rich soil.

Propagation of herbaceous Pæonies is effected by division; but this should not be practised more than is really necessary, because of its weakening influence on the parent plant. Large clumps soon form when they are well manured and left alone; they should not be planted too deeply. The Tree, or Moutan, varieties are grafted on the stout, fleshy roots of the herbaceous species, principally *P. albiflora* and *P. officinalis*. August is a good time to graft. The scions should be selected without flower-buds, and united to the stock-root, which should then be potted and plunged amongst ordinary soil in a frame, allowing the soil to cover the scion up a little way. If the frames are closed, and a slight shading applied, a union will generally soon take place, when air may be gradually admitted, but the plants may remain undisturbed till spring. Propagated also by layering, and sometimes by division.

FIG. 2. FLOWERING BRANCH OF PÆONIA ALBIFLORA.

P. albiflora (white-flowered).* *fl.* on a peduncle, more produced than in *P. officinalis*, often with a large, simple leaf just below the flower, and one or two large, foliaceous outer sepals; petals usually white or pink, but variable, 1½in. to 2in. broad. May and June. Follicles often three or four, less than 1in. long. *l.*, leaflets often confluent at the base, oblong, acute, 3in. to 4in. long, 1in. to 1½in. broad, glabrous, brighter green than in other species, often coloured at edges, and the veins also red; lower leaves with about five segments in each of the three divisions. Stems 2ft. to 3ft. long, glabrous, often branched, two to five-flowered. Siberia, 1548. The roots are sometimes eaten by the Mongolian Tartars. See Fig. 2. SYN. *P. edulis*. Varieties: *fragrans* (B. R. 485), *Humei=sinensis* (B. M. 1768), *tatarica* (B. R. 42), *uniflora* (B. M. 1756), *vestalis* (A. B. R. 64), and *Whitleyi* (A. B. R. 612; B. R. 630).

P. anomala (anomalous). *fl.* solitary; outer sepals produced into long, often compound, leafy points; corolla bright crimson, 4in. in diameter, with about eight obovate or oblong petals, 1in. to 1½in. broad; stamens ½in. to ⅔in. long. May. Follicles about three, ovoid, 1in. long. *l.* ten to twelve, cut into numerous confluent, lanceolate, acute segments, 1½in. to 2in. long, thirty to forty to the lower leaves, paler below. Stem 2ft. to 3ft. long. Root-tubers large, and fusiform; stolons none. Europe, &c., 1788. SYNS. *P. Fischeri*, *P. intermedia*. (A. B. R. 514; B. M. 1754.)

Pæonia—*continued.*

P. arietina (ram's-head-like). *fl.*, corolla dark red, 4in. in diameter. May. Follicles three or four, densely tomentose, ovoid, spreading almost horizontally from the base, 1in. long. *l.* five or six on a stem, pale green or glaucous, and pubescent beneath; segments oblong or oblong-lanceolate, copiously confluent, not more than 1in. to 1½in. broad, about thirty in the fully developed lower leaves. Stem 2ft. to 3ft. long, hairy upwards, single-flowered. South Europe. Allied to *P. peregrina*. SYN. *P. cretica* (B. R. 819).

P. Brownii (Brown's). *fl.* on a short peduncle; outer sepals leaf-like; corolla globose, not more than 1in. in diameter; petals dull red, brighter towards the edges. May. Follicles four or five, oblong, 1in. long. *l.* five or six, decompound, with very numerous, small, oblong, obtuse or sub-acute, copiously confluent segments, ⅛in. to ¼in. broad. Stems one-headed, not more than 1½ft. long, bending over till the follicles touch the ground. North America, 1826. Probably not now in cultivation. SYN. *P. californica*. (B. R. xxv. 30.)

P. californica (Californian). A synonym of *P. Brownii*.

P. corallina (coral-red). *fl.* on a short peduncle; outer sepals leafy, lanceolate, inner obtuse; petals six to eight, crimson or rose-red, obovate or sub-orbicular, 2in. to 3in. long. May. Follicles three, four, or rarely five, spreading from the base when mature, 1½in. long. *l.* five or six to a stem, glabrous, paler beneath, biternate, with nine distinct, oblong, acute segments, the side ones 1in. to 1½in. broad, the end one sometimes 2in. broad, and reaching a length of 3in. to 4in. Stem 2ft. to 3ft. long, one-headed. Tubers fusiform. Europe (not native of Britain), Asia Minor.

P. cretica (Cretan). A synonym of *P. arietina*.

P. daurica (Dahurian). A synonym of *P. triternata*.

P. decora (decorous). *fl.*, outer sepals broad, and leafy; petals six to eight, crimson, 1½in. to 2in. long, 1in. broad. May. Follicles two or three, tomentose, ovoid, very thin, diverging widely when mature. *l.* five or six to a stem, pale green or slightly glaucous, red at the margins, glabrous, or slightly pilose beneath; segments numerous and very confluent, thirty to forty to the fully developed leaves. Stem 2ft. to 3ft. long, glabrous, one-flowered. Servia, &c. Related to *P. arietina*.

P. edulis (edible). A synonym of *P. albiflora*.

P. Emodi (Mount Emodus).* *fl.* white, 3in. to 4in. in diameter; several of the outer sepals produced into leafy points; petals unequal, obovate, the outer 1½in. to 1¾in. broad. March. Follicles one or two, ovoid, ½in. in diameter. *l.* thin, glabrous, paler beneath; lower ones with twenty to thirty lanceolate, or oblong-lanceolate, very confluent, acuminate segments, 1in. to 1½in. broad. Stems 2ft. to 3ft. long, two or three-flowered when at all luxuriant. Himalayas, 1868. Rare in cultivation, but a fine plant. (B. M. 5719.)

P. Fischeri (Fischer's). A synonym of *P. anomala*.

P. humilis (dwarf). *fl.* on a short peduncle; calyx with often one to three very compound leaves from its base; petals bright red, orbicular, 2in. long. May. Carpels two or three, 1in. long, ½in. in diameter. *l.* five or six to a stem, the lower with twenty to thirty oblong, acute, copiously confluent segments, ½in. to ¾in. broad, dark green and glabrous above, pale and pubescent beneath. Stems 1½ft. to 2ft. long, one-headed, hairy towards the top. South of France, 1633. A well-known garden plant. (B. M. 1422.)

FIG. 3. FLOWERING BRANCH OF PÆONIA MOUTAN.

P. hybrida (hybrid). A form of *P. tenuifolia*.

P. intermedia (intermediate). A synonym of *P. anomala*.

P. laciniata (torn). A form of *P. tenuifolia*.

P. lobata (lobed). A form of *P. officinalis*.

P. mollis (soft). *fl.* like those of *P. officinalis* and *P. peregrina*, but smaller and duller in hue. May. Follicles similar, densely pilose. *l.* five or six, crowded, dull green above, glaucous and

Pæonia—*continued.*

densely pubescent beneath, cut into thirty to forty oblong-lanceolate segments, ⅜in. to 1in. broad. Stem about 1ft. long, one-headed, densely pilose. Not very distinct from *P. paradoxa.* (B. R. 474; L. B. C. 1263.)

FIG. 4. FLOWERING BRANCH OF PÆONIA MOUTAN.

P. Moutan.* Moutan Pæony. *fl.* various in colour, very large. May. Carpels small, numerous, densely pilose. *l.*, leaflets entire at base, often cut in the upper part into oblong, acute segments, glabrous on both surfaces, moderately firm, not at all decurrent on the rachis. Stems shrubby, copiously branched. *h.* 3ft. Widely cultivated in China and Japan. 1789. Fig. 3 represents a single-flowered, and Fig. 4 a double-flowered, variety of this beautiful species. (B. M. 1154.) Garden varieties: *Anneslei* (T. H. S. vi. 482, 7), *Banksii* (A. B. R. 448; B. R. 379), *Humei*, *papaveracea* (A. B. R. 463; B. M. 2175; L. B. C. 547), *Rawesii*, and *rosea* (A. B. R. 373; L. B. C. 1035).

P. officinalis (officinal).* *fl.*, sepals unequal, the inner obtuse, the outer acute and leaf-like; petals dark crimson, much imbricated, obovate or nearly orbicular, 1½in. to 2in. broad; stamens ½in. long; anthers rather shorter than the filaments. May. Carpels two or three, ovoid, densely tomentose, 1in. long when mature. *l.* five or six to a stem, glabrous, paler beneath, the lowest with fifteen to twenty lanceolate or oblong-lanceolate, acute, confluent leaflets, 1in. to 2in. broad. Stem stout, one-flowered, glabrous, 2ft. to 3ft. long. South Europe, 1548. The commonest species in gardens, especially in the double-flowered form. (B. M. 1784.) *P. lobata* is regarded by Mr. Baker as a dwarfer variety, with narrower and more numerous leaf segments.

P. paradoxa (paradoxical). *fl.* on very short peduncles. May. *l.*, lower ones cut up into from thirty to forty acute, confluent segments, ¼in. to ⅜in. broad, the largest not more than 1½in. to 2in. long. Stem 1ft. to 1½ft. high, with never more than a single flower. Otherwise like *P. peregrina*, of which it is "not in any broad sense more than a variety" (Baker). (S. B. F. G. 19.)

FIG. 5. FLOWERING BRANCH OF PÆONIA TENUIFOLIA FLORE-PLENO.

P. peregrina (foreign). *fl.* on a short peduncle; inner sepals orbicular, ⅜in. to 1in. long, outer with leafy points; petals five to ten, bright crimson, 2in. long, 1½in. to 2in. broad. May. Follicles two or three, erect-arcuate, ½in. in diameter; stigmas folded together. *l.* five or six to a stem, dull green and glabrous above, pale and pilose beneath, the lower with fifteen to twenty oblong, acute segments, 1in. to 1½in. broad, the longest 3in. to 4in. long. Stem 1½ft. to 2ft. long, one-headed, pubescent towards the top. South Europe, 1629. Common in cultivation. (B. M. 1050.) SYN. *P. pubens* (B. M. 2264).

P. pubens (downy). A synonym of *P. peregrina.*

P. Russi (Russ's). Follicles finely pubescent. *l.* thin in texture; segments ovate or oblong. Stem 1ft. to 1½ft. long. Otherwise like *P. corallina*, of which, according to Mr. Baker, it is scarcely more than a variety. Sicily, &c.

P. tenuifolia (slender-leaved).* *fl.* solitary, erect, surrounded by the crowded, reduced upper leaves; sepals orbicular, ½in. to ⅝in. long; petals dark crimson, elliptic-cuneate, 1½in. long; anthers shorter than the filaments. June. Follicles two or three, not more than ½in. long. *l.* ten to twelve, cut up into very numerous, linear, one nerved, confluent segments, less than one line broad. Stems one-headed, glabrous, 1ft. to 1½ft. long, densely leafy up to the flower. Root-tubers fascicled, with creeping stolons. Transylvania to the Crimea, &c., 1765. A well-known and very distinct type. (B. M. 926.) *P. hybrida* and *P. laciniata* are varieties with broader leaf-segments. The double state, a handsome garden plant, is shown in Fig. 5.

P. triternata (triternate). *fl.*, outer sepals leaf-like, inner obtuse; petals six to eight, rose-red, obovate, 2in. to 2½in. long. May. Follicles two to four, densely tomentose, spreading from the base when mature. *l.* five or six to a stem, glabrous, pale green above, glaucous beneath, with broad, oblong or obovate leaflets, obtusely rounded at the apex, with a small cusp, not confluent at the base; the side ones often 2in. broad, and the end one obovate or orbicular, 3in. to 4in. long and broad. Stem 1½ft. to 2ft. long, one-flowered, glabrous. Tubers thick. Caucasus, &c., 1790. Allied to *P. corallina.* SYN. *P. daurica.* (A. B. R. 486; B. M. 1441.)

FIG. 6. FLOWERING BRANCHES OF PÆONIA WITTMANNIANA.

P. Wittmanniana (Wittmann's).* *fl.* borne on a short peduncle; sepals orbicular, the longest over 1in. long; petals orbicular, yellowish-white, 2in. long; filaments longer than the small anthers. April. Carpels glabrous, with a small, spirally-curved stigma. *l.*, lower ones biternate, with usually not more than three segments in each division; leaflets thin, often 1½in. to 2in. broad, ovate, acute, dark green and glabrous above, hairy below. Stems one-headed. *h.* 2ft. Caucasus and North Persia, 1842. A well-marked species, but rare in cultivation. See Fig. 6. (B. M. 6645.)

Varieties. These are very numerously represented in both of the sections to which reference has been made in the foregoing cultural notes. Many produce flowers of an extraordinary size, and colours range in them through almost every variety and shade; they are also fragrant, and well adapted for travelling in a cut state. Subjoined is a selection, which comprises many of the best sorts:

Double Herbaceous Pæonies. June-flowering (varieties of *P. albiflora*). AMABILIS, satin rose; AMBROISE VERSCHAFFELT, rich purple, fragrant; ATROSANGUINEA, purple, golden anthers; AUGUSTE VAN GEERT, rose-pink; BELLE DOUAISIENNE, white, laced purple; BLANC, pure white (see Fig. 7); BOSSUET, magenta-rose; BUCKII, intense crimson-purple, rose scented; CARNEA ELEGANS, delicate pink, shading to white; CHARLES BINDER, rich magenta-rose; DECAISNE, deep rose, fragrant; DECANDOLLE, fine rose,

Pæonia—*continued.*

shading to pink, fragrant; DR. BRITONNAU, satin rose, centre white; DUCHESSE DE MODENA, rose, centre blush; ECLATANTE, rich purple; EDULIS, white; EDULIS FRAGRANS, deep rich rose; ETENDARD DU GRAND HOMME, brilliant rose, very large, rose-scented; FESTIVA MAXIMA, pure white, fragrant; FORMOSA, blush, centre primrose; FULGIDA, deep rose; GENERAL BEDEAU, rose, centre sulphur, very fragrant; GLOBOSA, deep pink, centre florets primrose; GLOIRE DE DOUAI, deep crimson, golden anthers; GRANDIFLORA NIVEA, white, tinged rose; HENRI IV., blush pink; HUMEI, scarlet-crimson, very dwarf; INCOMPARABILIS, rose, shaded purple, fragrant; INSIGNIS, rose-carmine, rose-scented; ISIDORE LEROY, crimson-purple; LOUIS VAN HOUTTE, purple-crimson; MADAME BOUCHALET AINE, rich purple-crimson, fragrant; MADAME CALLOT, white, tinged rose, rose-scented; MADAME DE MONTIJOU, blush, centre white; MADAME SCHMIDT, purple-crimson, showy golden anthers, fragrant; MADAME VILMORIN, blush, centre white; NOBILISSIMA, full deep rose; PAPAVERÆFLORA, white, centre primrose; PRINCE CHARLES, rose-purple, centre chamois; PRINCE PROSPER, purple-magenta, golden anthers; PULCHERRIMA, guard petals blush, centre white, rose scented; PURPUREA SUPERBA, rich glowing purple, fragrant; REINE DES ROSES, guard petals deep rose, centre chamois-rose; ROSEA MAXIMA, pink, inner florets white, tinged rose; ROSEA PRÆCOX, rose, early flowering; THE QUEEN, blush rose, very large, rose-scented; TRIOMPHE DE L'EXPOSITION DE LILLE, rich purple, fragrant.

Hardy European Pæonies. May-flowering (varieties of *P. officinalis*). DOUBLE ANEMONE-FLOWERED, large, rich crimson; petals somewhat irregular. DOUBLE RED, flowers large, rich crimson; abundantly produced; a very old variety. DOUBLE ROSE, flowers opening full rose, and changing to flesh colour; large and fine. DOUBLE WHITE, flowers large, opening pale pink, and changing to pure white.

Moutan, or Tree-Pæonies. May-flowering (varieties of *P. Moutan*). ALBA LILACINA, ATROPURPUREA, BEAUTY OF CANTON, BLANCHE NOISETTE, CANDIDA, CARNEA PLENA, COUNTESS OF CRAWFORD, ELIZABETHA, EMPEROR OF CHINA, GLORIA BELGARUM, INCARNATA PLENA, LACTEA, MANDARIN, MAXIMA PLENA, OCELLATA, OSIRIS, PRIDE OF HONGKONG, REINE DES FLEURS, ROBERT FORTUNE, SALMONEA, SNOWBALL, SOUVENIR DE GAND, SPECIOSISSIMA, STELLA, TRIOMPHE DE MILAN, VERSICOLOR PLENA, VILLE DE VERSAILLES, VIOLACEA PURPUREA, VIVID, ZENOBIA.

FIG. 7. FLOWERING BRANCH AND DETACHED FLOWER OF PÆONIA ALBIFLORA FLORE-PLENO "BLANC."

PÆONY. *See* **Pæonia.**

PÆSIA. Included under **Pteris** (which *see*).

PAGINA. The surface of any flat body; *e.g.*, that of a leaf.

PAGLE. An old name for the Cowslip, *Primula veris.*

PAGODA-TREE. A name applied to *Ficus indica, Plumeria alba,* and *Sophora japonica.*

PAIGLE. An old name for the Cowslip, *Primula veris.*

PAINTED. A term applied in cases where colours are arranged in streaks of unequal density.

PALAFOXIA (named after José Palafox, a Spanish general, 1780-1847). SYN. *Paleolaria.* ORD. *Compositæ.* A genus comprising half a dozen species of hardy, or nearly hardy, erect herbs, rarely shrubby at base, natives of Mexico and Florida. Flower-heads white, flesh-colour, or purple, small or mediocre, loosely corymbose-paniculate; involucre turbinate-campanulate, the bracts one or two-serrate; receptacle small, flat, naked, or scarcely foveolate. Leaves alternate, or the lower ones opposite, narrow, entire. The undermentioned species, which are the only ones worth growing, thrive best in a warm border of sandy soil, and should be treated as half-hardy annuals. Seeds should be sown, in a gentle heat, during April, and the young plants placed in the open, about 1ft. apart, early in June.

Palafoxia—*continued.*

FIG. 8. PALAFOXIA HOOKERIANA, showing Inflorescence and Disk and Ray Florets.

P. Hookeriana (Hooker's). *fl.-heads* rosy-pink, freely produced in loose clusters. Summer. Stems very bushy, about 2ft. high. Rocky Mountains, 1855. A very pretty, dwarf-growing, dense-habited plant. See Fig. 8. (B. M. 5549.)

P. linearis (linear). *fl.-heads* flesh-colour; involucre oblong; pappus scales eight, unequal, acuminate. June. *l.* linear, entire, obtuse. *h.* 2ft. Texas. Plant shrubby, cinereo-pubescent. (B. M. 2132.)

PALATE. A projection in the throat of a personate gamosepalous corolla.

PALAVA (named in honour of A. Palau y Verdera, professor of botany at Madrid in the last century). ORD. *Malvaceæ.* A small genus (three or four species) of tomentose or nearly glabrous, hardy or half-hardy annual herbs, natives of Peru or Chili, and with habit similar to *Cristaria.* Flowers purple, pedunculate, axillary, solitary; calyx five-fid. Leaves often lobed, sinuate, or dissected. The species thrive in ordinary garden soil. Propagated by seeds, sown on a hotbed in early spring, the seedlings being transplanted to the open border in May.

P. flexuosa (flexuous-stemmed). *fl.* light mauve, pale towards the centre, with bright red anthers and bases of the petals; sepals purple at base, very much smaller than the obliquely truncate petals. June. *l.* on slender petioles, 1in. to 2in. long; blade 1in. to 2in. long and broad, oblong-ovate or triangular-ovate, pinnatifid, with one or two pairs of spreading, lobed, or irregularly pinnatifid segments. Stems 8in. to 10in. long. Peru. 1866. (B. M. 5768.)

P. rhombifolia (rhomb-leaved). *fl.* large, scentless; corolla rose-coloured, flat, thrice as long as the calyx; petals five, obovate, cuneate; peduncles solitary, axillary. Summer. *l.* 1½in. long, rhomboid, soft. Stem prostrate, branched, hairy. Peru, 1830. (B. M. 3100; B. R. 1375.)

PALAVA (of Ruiz and Pavon). A synonym of **Saurauja** (which *see*).

PALEACEOUS. Covered with paleæ, *e.g.*, the receptacle of many of the Composites.

PALEÆ. Membranous scales, like chaff. The term is also applied to the inner scales of the flowers in grasses.

PALE FLAX. *See* **Linum angustifolium.**

PALEOLARIA. A synonym of **Palafoxia** (which *see*).

PALE TUSSOCK MOTH. *See* **Tussock Moths.**

PALIAVANA (said to be so called from Palhava, a seat of the Prince of Braganza, a patron of botany). SYNS. *Codonophora, Prasanthea.* ORD. *Gesneraceæ.* A small genus (only two species) of stove, shrubby plants, natives of Brazil. Flowers large, solitary or fasciculate in the axils of the bracts, disposed in loose, terminal racemes; calyx campanulate, the base adnate to the ovary, the five lobes at length reflexed or deciduous; corolla (generally) greenish, loosely pubescent or densely silky-villous, with a funnel-shaped or almost campanulate tube, and an oblique, broadly five-lobed limb. Leaves opposite, rather thick, soft, crenate, villous; floral ones reduced to bracts. For culture of *P. prasinata*—the only species which has been introduced to our gardens—*see* **Gesnera.**

P. prasinata (greenish). *fl.* borne on axillary pedicels, which are two to four times shorter than the corolla, which is greenish, darkly dotted externally, and has an ample campanulate limb. May to July. *l.* opposite, oval-lanceolate or ovate, serrate, shortly petiolate, velvety beneath. *h.* 1½ft. to 2ft. 1818. (B. R. 428, under name of *Gesnera prasinata.*)

PALICOUREA (named after Le Palicour, of Guiana). SYNS. *Colladonia, Galvania and Stephanium.* Including *Nonatelia* and *Rhodostoma.* ORD. *Rubiaceæ.* A genus comprising about 100 species of stove, tropical American shrubs, of variable habit, with terete or four-angled branchlets. Flowers variously coloured (never blue), small or rather large, disposed in sessile or usually pedunculate, terminal or rarely axillary, compound corymbs, racemes, or thyrses; calyx with a hemispherical or turbinate tube, and an entire or five-lobed limb; corolla tube elongated, straight or curved, the limb of five short or elongated, simple or valvate lobes. Fruit a globose, rarely oblong, berry. Leaves opposite or whorled; stipules variable. The following species are occasionally seen in cultivation; they thrive best in a sandy-loam and peat compost. Propagation may be effected, in spring, by cuttings, which should be inserted in sand, under a glass, in a gentle hotbed.

P. apicata (crowned-fruited). *fl.* yellow, in cymose, sessile panicles. June to August. *l.* oblong, short-acuminated, narrow at the base, coriaceous. Branches terete. *h.* 4ft. to 6ft. Caraccas, 1824.

P. crocea (saffron-coloured). *fl.* orange, on terminal, corymbose, saffron-coloured peduncles. June. *l.* ovate or ovate-lanceolate, acuminated, stiffish, with prominent veins. *h.* 4ft. to 6ft. West Indies, &c., 1823.

P. gardenioides (Gardenia-like). *fl.* white, disposed in mostly terminal cymes; corolla much longer than the calyx, tubular, funnel-shaped. Winter and summer. *l.* opposite, obovate-lanceolate, acuminate, attenuated into the short petioles, dark green and shining above, paler beneath. *h.* 2ft. South America, 1759. SYN. *Rhodostoma gardenioides.* (G. M. B. 1850, 65.)

P. lutea (yellow). *fl.* yellow, disposed in erect panicles; corolla tube narrow at the base, long; segments of the limb acute. June and July. *l.* broad-ovate, acuminated; stipules bluntly two-lobed. *h.* 1ft. French Guiana, 1823.

P. ornata (adorned). *l.* elliptic, acuminate, narrowed towards the base, of a satiny olive-green, with the costa and principal veins deep rosy-crimson, the olive tint passing into emerald-green near the base of the midrib; under surface purple. Stems erect, purplish, terete. South America, 1875.

P. Pavetta (Pavetta). *fl.* white, very sweet-scented, with a funnel-shaped corolla, which is a little curved; corymbs terminal, pedunculate, with brachiate, trichotomous branches. August. *l.* ovate-lanceolate, acuminated, thin, nerved. Branches terete. *h.* 2ft. West Indies, &c., 1823.

P. racemosa (racemose). *fl.* white, small, bracteolate at the base; thyrse panicled, a little longer than the petioles. June. *fr.* globose, five-angled, five-celled. *l.* elliptical-oblong, acuminated at both ends, petiolate. *h.* 2ft. to 3ft. Guiana, 1818.

P. rigida (stiff). *fl.* yellow; panicles on long peduncles, spreading; corolla clothed with very fine down. August. *l.* elliptic, acutish, rounded at the base, almost sessile, coriaceous. Branches bluntly tetragonal. *h.* 3ft. Tropical South America, &c., 1820.

Palicourea—*continued.*

P. violacea (violet). *fl.* white, bracteate; thyrse many-flowered, about half the length of the leaves. Berries violet, about the size of currants. June and July. *l.* elliptic, acuminated, tapering into the short petioles at the base. *h.* 4ft. to 5ft. Guiana, 1824.

PALISOTA (named in honour of Palisot de Beauvois, 1752-1820, a French botanist and traveller). SYN. *Duchekia.* ORD. *Commelinaceæ.* A genus comprising eight species of stove, perennial herbs, natives of tropical Africa. Flowers, small, numerous, disposed in simple, scorpioid cymes, sessile or shortly pedicellate; sepals and petals distinct, almost equal, similarly coloured, spreading; peduncles one or two in a leafy fascicle; panicle narrow, thyrsoid, oblong or cylindrical. Berries sometimes scarlet or blue. Leaves clustered at the tip of the stem; sheath imbricated, often long-pilose. The best-known species are described below. For culture, *see* **Commelina.**

P. Barteri (Barter's). *fl.* pale purplish, in an oblong, dense, thyrsoid raceme, borne on a short, terminal, solitary peduncle. Autumn. *l.* all radical, 1ft. to 2ft. long, obovate-oblong or elliptic-lanceolate, narrowed into petioles of variable length, attenuated at the apex into a long, slender point, more or less silky-hairy. *h.* 1ft. to 3ft. 1862. Plant almost stemless. (B. M. 5318.)

P. bicolor (two-coloured). *l.* oblong-obovate, tapering at the base to the stalk, and more abruptly towards the apex, 12in. to 14in. by 5in.; the upper surface bright green, with a broad, central disk of greenish-yellow; margins studded with stiff, brownish hairs; petiole fleshy, 4in. to 5in. long, with a broad, purplish band studded with coarse, brownish pubescence. *h.* 1ft. to 2ft. Fernando Po, 1878. An elegant, ornamental-leaved plant.

P. bracteosa (bract-bearing). *fl.* white, resembling those of *P. Barteri*, woolly outside at base; panicle shortly peduncled, very dense, ovate. Autumn. *l.* narrow-obovate, acuminate, white-cobweb-woolly. 1879. Plant stemless.

PALIURUS (the old Greek name used by Theophrastus). SYN. *Aubletia.* ORD. *Rhamneæ.* A genus comprising a couple of species of sub-erect or decumbent, glabrous or slightly tomentose, hardy shrubs, armed with stipular prickles; one is a native of South Europe and Western Asia, and the other of South China. Flowers small, five-parted; pedicels axillary, fasciculate, or in short, aggregated cymes. Fruit hemispherical, coriaceous. Leaves sub-distichous and alternate, petiolate, ovate or cordate, three-nerved, crenulated, with two thorns at the base of each, either both erect, or one erect and the other recurved. *P. aculeata* is supposed by some writers to have furnished the crown of thorns which was placed on the head of Christ before His Crucifixion. The species grow in any ordinary soil. Propagation may be effected by layers, by cuttings of the roots, or by seeds.

P. aculeatus (prickly). Christ's Thorn; Garland Thorn. *fl.* greenish-yellow; umbellules axillary, few-flowered, crowded. June and July. *fr.* resembling a head on which is a broad-brimmed hat. *l.* ovate, serrulated, quite smooth, three-nerved, with two spines at their base, one erect, the other hooked. Branchlets pubescent. *h.* 8ft. Mediterranean region, 1596.

P. Aubletia (Aublet's). *fl.* greenish-yellow, in axillary corymbs. July and August. *l.* obliquely cordate or elliptical, three-nerved, shining, serrulated, with two thorns at the base of each, one erect, the other recurved. Branches smooth. *h.* 10ft. South China, 1819. SYN. *P. virgatus* (B. M. 2535).

P. virgatus (twiggy). A synonym of *P. Aubletia.*

PALLASIA (of Linnæus the younger). A synonym of **Calligonum** (which *see*).

PALLASIA (of Houttuyn). A synonym of *Calodendron.*

PALLAVIA. A synonym of **Pisonia** (which *see*).

PALLAVICINIA. A synonym of *Cyphomandra.*

PALLENIS (from *palea*, chaff; in allusion to the chaffy receptacle). SYNS. *Asteriscus, Athalmus.* ORD. *Compositæ.* A monotypic genus. The species is a soft, sub-silky, villous, hardy, annual herb. For culture, *see* **Buphthalmum.**

P. spinosa (spiny). *fl.-heads* yellow, mediocre or rather large, solitary at the tips of the branches; achenes glabrous or slightly pilose; involucre hemispherical; receptacle slightly convex. July. *l.* obovate- or oblong-lanceolate, alternate, entire; floral

Pallenis—*continued.*

ones, or outer involucral bracts, leafy, often pungently mucronate. *h.* 2½ft. Orient, South Europe, and North Africa, 1570. (S. F. G. 898, under name of *Buphthalmum spinosum.*)

PALM. A general name for the members of the family *Palmæ.*

PALM. A measurement equalling 3in., or the breadth of the four fingers of the hand.

PALMA-CHRISTI. *See* **Ricinus communis.**

Palmæ—*continued.*

same subjects in their native forests. Those who have had the pleasure of seeing these "Princes of the Vegetable Kingdom," as Linnæus rightly styled them, in their native wilds, must feel that the impressions produced can never be effaced from the memory. While some tower, when full grown, to a height much surpassing 100ft., without emitting a leaf (*e.g.*, *Ceroxylon andicola*), the stems of others do not exceed 2ft. or 3ft. in length, and ¼in. in thickness; others,

FIG. 9. COCOS WEDDELIANA.

PALMÆ, or **PALMACEÆ.** This large order is pre-eminent, not only among monocotyledons, but in the whole world of plants, for the grandeur and beauty attained by many of the species. The order is also pre-eminently tropical in its distribution, so that, to dwellers in the cooler temperate zones, its wonderful beauty is a thing to be read of, not to be realised. Palms under glass, however spacious the accommodation allowed them, fail to impress the mind as do the again, have the stems so short that the leaves borne on the top of the stem rise out of the soil, and the whole plant does not exceed 3ft. in height. These dwarf Palms, however, are no less graceful than their lofty allies, and are, moreover, better known than the latter in European greenhouses, for which their dwarf stature so well fits them.

The stem is usually unbranched from the ground to the top, but in the *Hyphæne thebaica* it bifurcates

Palmæ—*continued*

several times, and it also does so in a few others. Once formed, the trunk of a Palm increases in height, but not in thickness, and it tapers upwards almost from the base. In most, the stems rise erect, or are only slightly curved; but in certain weak-stemmed genera, the stems lie on the soil, or twine among the branches of adjacent trees for support (*e.g.*, *Calamus*, *Desmoncus*, &c.). The outer surface of the trunk in Palms is usually very hard, while the centre is soft, and consists of a mass of thin-walled cells, amid which run the woody bundles. The central mass can be easily removed, leaving a hollow tube. The leaves vary no less than the stems; but they belong to two leading forms, viz., the *feather-veined*, in which the chief veins of the leaf-blade arise from the sides of a long midrib (see Fig. 9), and the *fan-veined*, in which the midrib is so short that, at first sight, the veins all seem to arise from the top of the leaf-stalk, and to spread out like

FIG. 10. LIVISTONA AUSTRALIS.

the ribs of a fan through the leaf-blade (see Fig. 10). In both forms, the blade may be undivided, except at the end, where there are always two lobes, separated by a division down to the midrib; or it may be divided partially, or down to the midrib along each side, and these segments, or pinnæ, may be few (as in Fig. 11) or many (*see* Fig. 9), and they may themselves be divided into smaller segments, as in *Caryota* (see Fig. 12). In length, the leaves vary between less than 1ft. (*e.g.*, in species of *Malortiea*) and a total of nearly

Palmæ—*continued.*

40ft. (as in the leaves of young plants of *Maximiliana regia*). The undivided lamina may, in a few species, reach a size of nearly 30ft. long by 5ft. broad (*e.g.*, in *Manicaria saccifera*). The leaves in the very young plants of almost all species of Palms are undivided,

FIG. 11. CHAMÆDOREA SARTORII.

except at the tip, and the species are remarkably alike, in most cases, while young.

The inflorescence assumes the form of a spadix, simple or branched, and frequently very much branched. The forms shown in Figs. 11 and 12 are of frequent occurrence. The spadix is inclosed in spathes, usually two in number; the outer, or lower, is short, and open at the tip; the inner is usually much larger, sometimes several feet long, woody or leathery, and, for a considerable time, entirely incloses the spadix. In some genera, there are from three to six spathes, only the inner of which is complete; and, in the tribe *Calameæ*, the spathes are replaced by a large number of short, tubular, incomplete spathellæ, ranged all along the peduncle and branches. The spadix always bears numerous inconspicuous flowers, which, in by far the greater number of species, are unisexual, not often hermaphrodite. Individual plants, or individual spadices in many species, are either male or female; but, in most, the same spadix bears flowers of both sexes, the females usually lower down, the males nearer the tips of the branches; or they may be associated in various ways, *e.g.*, in *Cocoinæ*, *Geonoma*, &c.; there is frequently a male flower at each side of a female, so that they stand in groups of three. They are often sunk in pits in the fleshy spadix, or they may be stalked; the flowers are almost always quite regular in structure. Frequently, the abortive male organs are found in female flowers, and *vice versâ*. The stamens are usually six, but vary

Palmæ—*continued.*

from three to very many. The ovary is typically composed of three carpels, rarely of more; but, usually, only one grows to ripeness, and only the remains of the others are left in the ripe fruits. These vary greatly. In certain groups, they resemble berries; in others, they are more like drupes, with a hard inner layer, or endocarp, as in the well-known Cocoa-nut and the Coquilla-nut, so often used for carved ornaments. The outer coat of the fruit is usually thin, leathery or dry, and smooth, or only bears prickles; but, in *Calameæ*, it is covered with scales, arranged in spirals. The middle layer of the fruit (mesocarp) is usually traversed by woody

FIG. 12. CARYOTA SOBOLIFERA.

bundles, which, in some, are extremely abundant, and, in others, rather few and ill-developed. In the Cocoa-nut, this layer is very thick and fibrous, and, from it, "coir," or fibre, for ropes, matting, &c., is prepared. In many Palms, the mesocarp contains oil in considerable quantity. The fruits of the "Oil Palm" (*Elaëis guineensis*) yield so much that they form a valuable export from West Africa, for use in candle-making, &c. There is usually only one ripe seed in each fruit, those in the abortive ovaries remaining undeveloped; but, occasionally, two or more may ripen. The seeds are large, but the embryo is usually small, and is sunk in

Palmæ—*continued.*

a pit in the large perisperm, or albumen. This latter is white, or may be streaked with brown. In some it is fleshy (Cocoa-nut), in others horny (Date); and in the "Ivory Palms" (*Phytelephas*) it is so compact and hard as to be very largely used as a substitute for real ivory, in the manufacture of billiard balls and many other articles.

A noteworthy peculiarity of many Palms is that they have the stems, leaves, and even the spathes and fruits, covered with sharp prickles, usually of a dark colour, which form a most efficient defence against enemies. In some kinds (*e.g.*, *Astrocaryum Jauari*, &c.), the prickles on the trunk may reach a length of nearly 1ft., and a breadth, at the base, of nearly ½in. In certain climbing Palms (species of *Calamus* and *Desmoncus*, for instance), the prickles are hooked, or so placed as to assist the plants in climbing; but aid in this is still more efficiently given in *Desmoncus* and a few *Chamædoreæ* by certain leaflets, near the end of the leaf, being altered to form strong, recurved hooks. *Palmeæ* are not very closely related to any other order: *Juncaceæ* seem, on the whole, most nearly allied to them. There are from 1100 to 1200 recorded species, though a considerable number of these are not well known. They are almost confined to the tropics, extending beyond these limits in exceedingly reduced numbers. *Chamærops humilis* is the only species native in Europe, where it reaches 44deg. N. Lat. The limits of latitude elsewhere are about 34deg. N. in Asia, 36deg. N. in America, 34deg. S. in Africa, 37deg. S. in S. America, in Chili, and 44deg. S. in New Zealand.

The leading genera of Palms are noticed in this work, in so far as they are of interest to gardeners; they are too numerous to be repeated here; but several of the more important genera are referred to in this article. Among the richest in species are: *Astrocaryum*, *Attalea*, *Bactris*, *Calamus*, *Caryota*, *Chamædorea*, *Cocos*, *Desmoncus*, *Geonoma*, *Hyphæna*, *Korthalsia*, *Licuala*, *Livistona*, *Phœnix*. In addition to these, there are many genera that, despite the small number of species included in them, are of importance, either as greenhouse plants, or because of their useful products. The genera are almost confined to either the Old World or the New: *Raphia*, among *Calameæ*, and *Elaëis* and *Cocos*, among *Cocoinæ*, alone breaking this rule, out of 132 genera recognised in Bentham and Hooker's "Genera Plantarum." In each case, only one species is common to the two hemispheres. These species are *Cocos nucifera* (Cocoa-nut), *Elaëis guineensis* (Oil Palm), and *Raphia vinifera*.

The uses of Palm-trees, and of their products, to natives of tropical lands, are far beyond what it is possible for residents in temperate regions to conceive. The stems of some supply the timber used in building houses, or the laths for forming partitions; while the tough stems, or rind of the stems, of others supply strong cordage for binding together the beams, for chair-making, and for many other household purposes. The stems of others split, and each half hollowed, make aqueducts; and of others the South American Indians make their blow-pipes for shooting out poisoned arrows. The leaves are largely used for thatch, or for walls of houses; for making fans, umbrellas, household utensils, and even tents. From the young leaves of various species fibres are largely prepared, which are used for making hammocks and other durable articles. The leaf-blades of a few are used as paper in the East; and the fibres of several species are employed in paper-making. The coarse, woody bundles that surround the stems of two American Palms are used largely for making besoms, under the name "Piassába fibre." Two American Palms produce vegetable wax in such abundance as to be worth collecting for sale and export. In *Ceroxylon andicola*, the

Palmæ—*continued.*

wax is formed on all parts of stem and leaves; in *Copernicia cerifera*, it is found only on the leaves. An Eastern Palm (*Calamus draco*) yields a resinous, red substance, known as "Dragon's Blood," of an astringent nature, exuded from stems and fruits. Reference has already been made to the preparation of coir from the cocoa-nut, and to the uses of Coquilla-nut kernels, and of the perisperm of the Ivory-Palm, for carved ornaments, &c. As yielding food to human beings, Palms are not less valuable. The softer tissues of the interior of the stems of many trees contain large quantities of starchy stuffs, which, when prepared, form the well-known Sago. The greater part of that brought to Europe is obtained from *Metroxylon læve* and *M. Rumphii*. The seedling plants of the Palmyra Palm (*Borassus flabelliformis*), and the tender tissues of the terminal bud of many Palms, are cooked and eaten in various regions of the tropics. A sweet juice, containing a large amount of sugar, is obtained from cuts in the young tissues of many Palms. When allowed to stand, the juice ferments, and forms a drink much used under the name of Palm-wine or Toddy. The fruits of several species of *Palmeæ* afford valuable articles of food. Pre-eminent among these are the Date, either fresh or preserved, since it forms the chief food of multitudes of persons in Northern Africa. The perisperm of the Cocoa-nut forms a great part of the food of various other tropical races. Of less importance as food are the fruits of the Peach Palm, and of certain other Palms of America; but even these form a valuable resource, at times, to the native races. From the fruits and seeds of many Palms a large amount of oil can be expressed. The oil obtained from the Oil Palm, as already mentioned, is a valuable article of commerce, and that from several other species is also suitable for use, though not so abundantly produced. From the fruits of certain kinds (*Elaëis melanococca, Euterpe edulis, E. oleracea, Œnocarpus Bacaba, Œ. Bataua, Œ. distichus*, &c.), the natives of South America are accustomed to prepare a pleasantly-flavoured drink by crushing the fruits in water. Though this, also, is called Palm-wine, it contains no alcohol, if drunk, as it always is, when freshly made; but alcohol can be obtained from similar preparations of many Palm fruits, when they are allowed to ferment. But to indicate the many uses of Palms is impossible in a brief article. In conclusion, it may be mentioned that in the Tamil language of Southern Hindostan a poem exists, called "Tála vilásam," in praise of the Palmyra Palm (*Borassus flabelliformis*); in it 801 uses for this single species are mentioned, and, even to this number, others might easily be added. Those who desire information on this noble order of plants will find Seemann's "Popular History of Palms" serviceable as an introductory work. Martius' large and expensive "Historiæ Palmarum" is still the only comprehensive work on the group; but very great additions to our knowledge have been made since it was published. Bentham and Hooker's "Genera Plantarum" is the best and most recent source of information upon the genera. The Palms of Asia have been written upon by Blume, Griffith, Scheffer, Beccari, and others; those of Australia by Müller, Wendland, and Drude; the few species from Africa by Wendland and Mann; and the American Palms by Pöppig, Humboldt and Bonpland, Martius, Wendland, Grisebach, Wallace, Spruce, Trail, Im Thurm, and others. The most important work of late years on American Palms is one by Drude, in "Flora Brasiliensis," on the Palms of Brazil.

Remarks on Decorative Uses, Culture, &c. The majority of Palms are by no means difficult to cultivate; yet there are a few points relating to their management which require strict attention. All of them need good drainage, and an abundant supply of water in summer; in winter, too, their roots must never approach dryness.

Palmæ—*continued.*

By far the larger proportion are stove plants, and, as such, they need a considerable amount of heat, as well as moisture. One species (*Trachycarpus Fortunei*) is, however, hardy enough to live outside in many favourable localities all the year round; several are available for sub-tropical gardening in summer, and succeed in a warm greenhouse temperature in winter. Many others of a tenderer description may be utilised for conservatory embellishment in summer, if transferred to warmer quarters again in autumn. For exhibition, nothing is of nobler aspect than large specimen Palms; these may be most successfully cultivated in pots, or tubs, small in proportion to the size of plant. As decorative subjects for dinner tables, some of the elegant-habited Palms in a small state are indispensable, particularly the well-known and beautiful *Cocos Weddeliana*, than which nothing better for the purpose exists. Some of the stiffer-growing species withstand confinement in rooms and indifferent treatment remarkably well, even for a long period. Palms represent, therefore, an invaluable class of plants in gardens generally, and a selection of the most useful species is indispensable wherever plant-grouping for effect, and other phases of horticultural decorating, have frequently to be executed.

Propagation. A few Palms may be propagated from suckers where there are established plants from which such may be procured; but the general method of increase is from imported seeds. Some of these germinate in a much shorter time than others, and also grow on faster afterwards. Seeds should be sown thickly in clean, well-drained pans, and covered with about their own depth of soil; this latter should be rendered rather fine, and should consist of about two parts yellow loam and one sharp silver sand. It may be observed that the seedlings must remain, in many instances, a long time in the seed-pans; the kind of soil, and the amount of drainage are, therefore, important considerations. The pans should be plunged in, or placed immediately above, a brisk bottom heat, and kept watered, though not sufficient to cause sourness. Seeds may be sown at almost any season—early spring being that preferred. Many of the slender-growing and more delicate species may have a small portion of peat added to the loam and silver sand, as this sometimes tends to encourage root action quicker and better than when a heavier soil is used.

After-treatment. Palms always succeed better, provided proper attention is given to watering, when they are somewhat restricted at the root, than when over-potted; and this rule is applicable from the very first. When two or three leaves are formed on the seedling plants, they should be placed in the smallest-sized pots that will contain their roots without injury, and be arranged close together in a house where a high temperature and moist atmosphere are maintained. It is important at the first, and also at every subsequent potting, that no part of the stem be buried; the plant's base should merely rest on the surface of the soil, which should be rendered firm throughout by a hand rammer. Roots of Palms should never be cut, if it can possibly be avoided; indeed, with some genera, this practice would be likely to prove most disastrous. Repotting should be conducted according to the rate at which the plants progress: some grow much faster than others. The quantity of roots may be taken as a guide; if these are not more or less crowded, the operation of re-potting may be deferred, as a rule, until they are. Established plants, of any size, should be overhauled in early spring, and any necessary shifting done. If roots are found to have become matted near the base, the old crocks should, if possible, be removed, and soil afterwards substituted. The ball should then be placed intact in another pot, where there is a space of about 2in. all round; this will often suffice for the next two years, at

Palmæ—*continued.*

least. When repotting is unnecessary, a light top-dressing may be given instead. It is essential that the ball should be in a proper condition regarding moisture, at the time of repotting, whether of small or large specimens. In a young state, the smallest shifts are recommended, consistent with the rate of progress made by the plants. In houses of large dimensions, Palms may be planted out; at least, those which are calculated to attain a great height, and are expected to be otherwise proportionately large when developed. For a conservatory, of course, only a few will succeed all the year round; yet these should be utilised for specimens in some part of the beds. The main points in the successful culture of Palms so treated, are much the same as if they were in pots, namely, good drainage and plenty of water. In summer, syringing morning and evening may be freely practised; in winter, the moisture from evaporation, caused by damping the floor and stages, will usually be found sufficient. As Palms have to remain, perhaps, many years in the same soil, it is important that only such as is suitable should be used. Some authorities recommend equal proportions of loam, vegetable mould, peat, and sand, as a general compost. Anything tending to decay, except very slowly indeed, should not be used, as, possibly, it might kill, rather than encourage, the roots. Peat is not altogether a necessity for established Palms; in yellow loam, with plenty of sand, and some charcoal intermixed, they will grow well, and make firmer, yet, perhaps, somewhat slower growth, which is, of the two, more desirable. Manure water is of great assistance to Palms when their roots are somewhat restricted, provided the plants are in good health. It should be made from cow-manure and soot, which imparts a healthy appearance to the leaves. Some information on culture, and references to the uses for which various Palms are best suited, will be found under all the more important genera included in *Palmeæ* throughout this work.

PALMATE. Having five lobes, the midribs of which meet in a common point, so that the whole bears some similarity to the human hand; *e.g.*, the leaf of the common Passion-flower.

PALMATIFID. Cut half-way to the base in a palmate manner. A Palmatifid leaf is shown at Fig. 13.

FIG. 13. PALMATIFID LEAF.

PALMATILOBED. Cut into shallow divisions in a palmate manner.

PALMATIPARTED, PALMATISECT. Cut nearly to the base in a palmate manner. Almost digitate.

PALM, CABBAGE. *See* **Oreodoxa oleracea.**

PALM, DATE. *See* **Phœnix dactylifera.**

PALMETTO, CABBAGE. *See* **Sabal Palmetto.**

PALMETTO, DWARF. *See* **Sabal Adansonii.**

PALMETTO PALM. *See* **Sabal Palmetto.**

PALMETTO, SAW. *See* **Serenoa serrulata.**

PALM, FAN. *See* **Sabal Blackburniana.**

PALMIA (named after L. H. Palm, author of a work on "The Climbing of Plants," published at Stuttgart, in 1827). SYN. *Shutereia.* ORD. *Convolvulaceæ.* A monotypic genus. The species is a beautiful, pubescent, twining herb, inhabiting tropical Asia and Africa. It may be raised from seeds, on a hotbed, in spring, and the young plants, when of sufficient size, should be placed in separate pots, and trained to sticks. Unless a very warm and sheltered position is at command, they require to be placed in the stove or greenhouse to blossom and ripen their seeds. *Hewittia* is now the correct generic name.

Palmia—*continued.*

P. bicolor (two-coloured). *fl.* very white or pale yellowish, with a dark purple centre, one to three on an axillary peduncle; sepals acute, the outer ones much broader; corolla campanulate, with a plicate, five-angled limb; pedicels very short. August. *l.* broadly cordate, entire, angled, or trilobed. 1812. (B. M. 2205 and B. R. 318, under name of *Convolvulus bicolor.*)

PALMISTE ROUGE. *See* **Dictyosperma rubrum.**

PALMITE RUSH. *See* **Prionium Palmita.**

PALM, PATANA. *See* **Œnocarpus Bataua.**

PALM SAVANAH. *See* **Sabal mauritiæformis.**

PALM, THATCH. *See* **Sabal Blackburniana.**

PALM-VEINED. Having the main vein radiating from a common point.

PALMYRA-TREE. A common name for *Borassus flabelliformis.*

PALO DE VACA, or **COW-TREE.** *See* **Galactodendron utile.**

PALSY-WORT. An old common name for **Primula veris** (which *see*).

PALTONIUM. Included under **Tænitis** (which *see*).

PALUDOSUS, PALUSTRIS. Growing in marshy places.

PALUMBINA (from *palumbes*, a wood-pigeon; in allusion to the fancied resemblance which the flowers bear to this bird). ORD. *Orchideæ.* A monotypic genus, now included, by Bentham and Hooker, under *Oncidium.* The species is an elegant stove orchid, the flowers of which have been compared to "flying doves." They remain a long time in perfection. For culture, *see* **Oncidium.**

P. candida (white). *fl.* pure white, about 1in. across, of a stout, waxy consistence; lip with a few reddish spots; racemes few-flowered. Summer. *l.* narrow, solitary, 6in. to 12in. long. Pseudo-bulbs, narrow, compressed. Mexico, 1843. SYN. *Oncidium candidum.* (B. M. 5546.)

PAMPAS GRASS. *See* **Gynerium.**

PANÆTIA. Included under **Podolepis** (which *see*).

PANAX (an old Greek name, used by Theophrastus, and akin to *panakes*, a panacea, or remedy, for all complaints; applied to the present plant in reference to the stimulant drug, Ginseng, to which miraculous virtue is ascribed by the Chinese). ORD. *Araliaceæ.* A genus comprising about twenty-five species of stove, greenhouse, or hardy, glabrous, or rarely woolly-tomentose trees or shrubs, natives of tropical and Eastern Asia, extending to Mandchuria, tropical Africa, the Pacific Islands, New Zealand, and Australia. Flowers often polygamous, in small umbels; umbels rarely in contracted heads, or in small, solitary, racemose or paniculate racemes; petals five; pedicels articulated beneath the flowers. Fruit compressed or rarely sub-globose, fleshy, or rarely sub-membranous. Leaves digitately or pinnately compound, or rarely undivided; leaflets entire, argutely toothed or cut. *P. diffusum, P. dissectum, P. dumosum, P. fissum, P. laciniatum, P. plumatum, P. Victoriæ,* and others bearing specific names in gardens, though distinct enough for horticultural purposes, are, in all probability, mere forms of the variable *P. fruticosum.* These plants are of moderately free growth, and the majority are easy to manage. Those requiring stove treatment should be potted in sandy loam and peat, with the addition of a little leaf soil and sand. The stronger-growing kinds thrive in a richer compost. Propagation by cuttings of the roots is a common and successful method. The stems of plants from which the roots have been taken may also be cut into pieces 1in. or 1½in. long, pressed into pots of sand or sandy soil, and plunged in bottom heat. If the stems are cut down without disturbing the roots, and the pots are plunged in bottom heat, and kept moderately

Panax—*continued.*

watered, they will probably throw up several suckers or shoots. These, if taken off with a portion of root to each, will, with a little care, soon make useful plants.

P. armatum (armed). *fl.* numerously produced in umbellules, forming a long, downy panicle. *l.* bipinnate, on long stalks, which are prickly, like the stem; leaflets ovate-acuminate, membranous, serrated, beset on both surfaces with bristly hairs. Stems erect, prickly. India, 1876. A fine-looking, stove shrub. SYN. *Aralia armata.*

P. crassifolium (thick-leaved). A synonym of *Pseudopanax crassifolium.*

P. diffusum (diffuse).* *l.* pale bright green, densely packed towards the apices of the jointed stems, triangular, bipinnate, crispy; primary divisions with linear-oblong, sometimes lobed, always spiny-toothed, bluntish secondary divisions, the teeth turned upwards. *h.* 2ft. South Sea Islands. An ornamental, compact-growing, bushy-habited, stove shrub.

P. dissectum (dissected). *l.* numerous, drooping, bipinnate, having obovate-cuneate leaflets, very greatly varied in size and outline, all furnished with long, marginal teeth. An evergreen stove shrub, of branching habit, very desirable and ornamental.

P. dumosum (bushy).* *l.* bright green, roundish-ovate, pinnately divided, of numerous, variously-shaped lobes, the pinnæ furnished at the margins with incurved, spiny teeth; petioles brownish or olive-green, mottled with brighter green. Stem short-jointed, thickly clothed with leaves. *h.* 6in. to 18in. A very neat and compact-growing stove shrub.

P. elegans (elegant).* *fl.* produced in racemes, which are collected into a large, terminal, branched panicle. *l.* articulate, spreading, and variously divided, pinnate towards the point, with elliptic-oblong, stalked leaflets, while at the basal part they are bipinnate. Queensland, 1880. A pretty and effective, ornamental-leaved shrub (a large and handsome tree in its native habitat), probably hardy in mild districts.

P. fissum (cleft). *l.* tripinnate, the alternate segments linear-lanceolate, with a few incurved, whitish teeth on each margin. Stem erect-branched, flecked with small, elongate, pallid spots, the petioles being of the same colour. South Sea Islands, 1882. An elegant stove shrub.

P. fruticosum (shrubby). *fl.* in terminal, corymbose panicles, with the branches umbelliferous at the apex. *l.* pinnately decompound; leaflets petiolate, oval-oblong, acuminated, coarsely and dentately serrated, ultimate ones deeply trifid. *h.* 6ft. India, Java, &c., 1800. Stove shrub. (A. B. R. 595.)

P. f. Delauana (Delau's). *l.* digitately compound, with divisions ternately or biternately divided; the segments varying from linear-cuneate to obliquely sub-elliptic, irregularly lobed and toothed, green, with whitish-tipped teeth. Polynesia, 1833. An ornamental, dwarf shrub. (I. H. 492.)

P. laciniatum (laciniate).* *l.* tinted, and indistinctly marked with pale olive-brown, bipinnate, nearly as broad as long, drooping; the segments very variable in size and form, presenting the appearance of a complex head of foliage, in which the lanceolate lobes have the preponderancy. South Sea Islands, 1877. An elegant and distinct, stove shrub.

P. longissimum (very long). A synonym of *Pseudopanax crassifolium.*

FIG. 14. PANAX MURRAYI.

P. Murrayi (Murray's). *fl.*, umbels many-flowered, pedunculate, in racemes or divaricately-branched panicles. *l.* simply pinnate, often several feet long; leaflets variable, obliquely lanceolate, entire or variously cut or toothed. Queensland, &c. A splendid tree. See Fig. 14. (B. M. 6978.) SYNS. *P. sessiliflorum* (of Carrière), *Aralia splendidissima* (of gardens). The species to which the name of *sessiliflorum* belongs has trifoliolate leaves, and is a native of Mandchuria.

Panax—*continued.*

P. plumatum (plumed).* *l.* forming a fine, crispy head, very elegantly divided; the leaflets long-stalked and more or less deeply lobed, the edges notched with more or less upcurved teeth. South Sea Islands, 1874. An elegant, small-growing, stove shrub, having the aspect of *P. laciniatum*, but being much more finely cut.

P. quinquefolium (five-leaved). Ginseng. *fl.* yellowish; peduncle of umbel shorter than the petiole. June. *l.* verticillate, petiolate, palmately decompound, the leaflets stalked from the top of the common petiole. *h.* 1½ft. North America, 1740. Hardy, herbaceous. (B. M. 1333.) The proper name of this plant is *Aralia quinquefolia.*

P. sambucifolius (Elder-leaved). *fl.* greenish, small, in umbels, which are collected into racemes, corymbs, or panicles. *fr.* bluish, transparent, attractive. *l.* pinnate, or bipinnate; leaflets elliptic or lanceolate, glaucous beneath. Branches slender. Greenhouse. (B. M. 6093.)

P. sessiliflorum (sessile-flowered), of Carrière. *See* **P. Murrayi.**

P. Victoriæ (Queen Victoria's).* *l.* finely variegated, ternate or almost pinnate, the lateral leaflets forked or trifid, the upper and terminal one larger, simple, ovate, the edge lobed and spinosely toothed, and having the border prettily margined with white. South Pacific Islands. A distinct and graceful, variegated-leaved stove shrub, the leaves forming a dense, plumy, gracefully recurving mass of foliage. (G. C. n. s., xix. 405.)

FIG. 15. PANCRATIUM ILLYRICUM.

PANCRATIUM (from *pan*, all, and *kratys*, potent; in allusion to supposed medicinal qualities). ORD. *Amaryllideæ.* A genus comprising about a dozen species of

Pancratium—*continued.*

stove, greenhouse, or hardy bulbous plants, natives of the West Indies, the Canary Islands, and the Mediterranean region. Flowers white, large, sessile or distinctly pedicellate, many in an umbel, or rarely only one or two; perianth funnel-shaped; tube mediocre, or often elongated into an enlarged throat; lobes narrow, erecto-patent; cup (false corona) frequently produced into two teeth or lobes; involucral bracts two, membranous-scarious. Leaves linear or loriform. Pancratiums are of easy culture, in a compost of two parts good turfy loam, one part peat, and one part decayed leaf soil, to which some silver sand should be added. The indoor species should be placed in a light position; from the end of June until the middle of September they may be kept in a frame or pit. The less shifting and repotting is practised, the better, provided the plants remain healthy. Pancratiums may be grown singly, or three in a pot. When a shift is necessary, all the living roots should be carefully preserved, and any dead ones cut away. Water may be given freely throughout the growing season; when resting, it should be partially withheld, yet not sufficiently to cause flagging. The species grown outside require deep planting, and a protection of some sort in winter. When the plants have once started, their growth cannot well be too rapid, nor the supply of food too liberal. Propagation is effected by seeds, which should be sown in pans of light, sandy soil, in spring, and placed in heat. Water must only be sparingly given until the seedlings appear, and the latter should be potted off when large enough to handle. Propagated also from offsets, which may be collected at potting time. Young bulbs, if carefully grown on, will, in the course of two or three years, make good flowering plants. The only truly hardy species is *P. illyricum*; but *P. maritimum* is hardy enough in mild districts, such as many parts of the West of England. Elsewhere, it is advisable to grow these in a cool greenhouse or frame.

P. Amancæs (Amancaes). A synonym of *Hymenocallis Amancæs.*

P. amboinense (Amboynan). A synonym of *Eurycles amboinensis.*

P. amœnum (charming). A synonym of *Hymenocallis amœna.*

P. australasicum (Australian). A synonym of *Eurycles amboinensis.*

P. calathinum (basket-flowered). A synonym of *Hymenocallis calathina.*

P. carolinianum (Carolinian). A synonym of *P. maritimum.*

P. expansum (expanded). A synonym of *Hymenocallis expansa.*

P. illyricum (Illyrian).* *fl.* fragrant, pedicellate, smaller, and with a shorter tube than in *P. maritimum.* June. *l.* broad, ligulate, deciduous, strongly veined. *h.* 1½ft. South Europe, 1615. An exceedingly attractive plant, quite hardy in most situations. See Fig. 15.

P. littorale (sea-shore). A synonym of *Hymenocallis littoralis.*

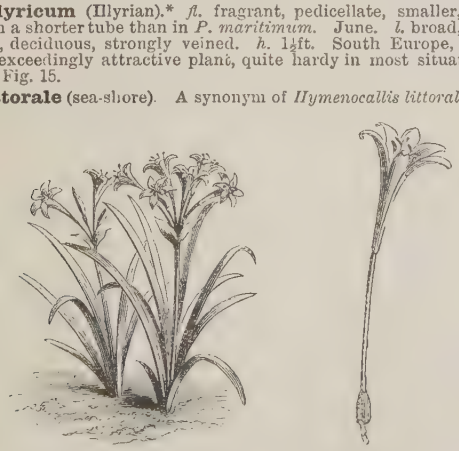


FIG. 16. PANCRATIUM MARITIMUM, showing Habit and detached Flower.

P. maritimum (sea).* *fl.* with long, filamentous outer segments, very fragrant, nearly sessile, disposed in large umbels. June. *l.* linear, persistent. *h.* 2ft. South Europe, &c., 1759. Hardy, or nearly so. (B. R. 161.) See Fig. 16. SYN. *P. carolinianum* (B. R. 927).

P. rotatum (rotate). A synonym of *Hymenocallis rotata.*

P. speciosum (showy). A synonym of *Hymenocallis speciosa.*

P. verecundum (ruddy). *fl.* sweet-scented, pedicellate; tube of corolla greenish, 2in. to 3in. long; limb campanulate; segments white inside, green without; scape 1ft. or more long. Summer. *l.* eight to ten, lorate, acute, convolute, channelled, 1½ft. long, ¾in. or more broad. Bengal, &c. Stove. (B. R. 413.)

P. zeylanicum (Cingalese). *fl.* solitary; laciniæ longer than the tube, adherent below, revolute above; style longer than the stamens; spathe entire. June. *l.* lorate-lanceolate. Bulb ovate. *h.* 1ft. Ceylon, 1752, Stove. (B. M. 2538; B. R. 479.)

PANDACA. A synonym of **Tabernæmontana** (which *see*).

PANDANEÆ. A natural order of curious, erect or climbing trees or shrubs, di- or tri-chotomously branched, the annulate trunk or branches emitting aërial roots; they are all tropical or sub-tropical, mostly natives of the East African Islands, the Indian Archipelago, and the Pacific Islands; a few are found in the Asiatic and African continents, one in the West Indies, and another in New Zealand. Flowers dicœcious, each sex densely crowded on a simple or compound, axillary or terminal, sessile or pedunculate spadix, accompanied by herbaceous or coloured, persistent or deciduous spathes; males on a branched or thyrsoid spadix with numerous stamens and filaments, with single two- or four-celled anthers; females with one or many-celled ovaries, free, or united in parcels, solitary or numerous ovules, and a sessile stigma. Fruit either woody drupes collected in parcels, or berries; seeds minute, albumen densely fleshy. Leaves clustered, spirally and trifariously disposed, very long-linear and sheathing at base, acuminate, recurved, keeled, concave, rigidly coriaceous, the margins and keel spinulose or serrated, very rarely unarmed, at length totally deciduous; prickles often recurved, or the lower ones recurved and the upper ones incurved. The species, numbering about eighty, have no great economic value; they are classed under two genera: *Freycinetia* and *Pandanus.*

PANDANUS (from *Pandang*, the Malayan name of the genus). Screw Pine. ORD. *Pandaneæ.* A large genus (about eighty species) of stove trees or shrubs, rarely stemless herbs, or with prostrate rooting stems; they are mostly natives of the Malayan Archipelago and the Mascarenes and Seychelles, a few being found in the continents of Asia and Africa, tropical Australia, and Oceania, and in the West Indies. Flowers dicœcious, the males on a clustered, thyrsoid spadix, and the females on a dense, simple one; both are terminal, the females solitary or paniculate, often pendulous during fructescence. Fruit syncarpous, globose, ellipsoid, oblong or cylindrical, often ponderous. Leaves very long or mediocre; floral ones sometimes coloured, spathaceous-bracteate. Trunk slender or robust, rather simple, or with spreading branches. Screw Pines are usually very handsome, and easily cultivated in a stove temperature. They succeed best in sandy loam, with charcoal and some leaf soil intermixed, and they require plenty of water in summer. In winter, they are best kept moderately dry at the root, and no water should be allowed to lodge in the axils of the leaves at that season. The plants always have a disposition to raise themselves out of the pots, in consequence of the direct downward course which the roots invariably pursue. One of the best and most useful species is *P. Veitchii*; it is largely employed, in a young state, for table decoration, for which purpose offsets should be procured so soon as they are large enough to be detached. This species, and several others, form handsome decorative or exhibition subjects in comparatively small pots. Propagated principally from offsets, which should be carefully detached from the base with the point of a sharp knife, and inserted singly in small pots. The crown of each cutting

Pandanus—*continued.*

must be kept well up, the pots should be plunged in a close propagating frame, and but little water should be given until roots are formed. Propagated also from

FIG. 17. PANDANUS CANDELABRUM VARIEGATUS.

seeds, and from suckers. The species of this genus are remarkable for their aërial roots, with large, cup-like root-caps. They are of variable size, but usually form large bushes about 10ft. to 15ft. high.

Pandanus—*continued.*

30ft. or even more, and sending down large roots, which look like stems, and secure them in their positions."

P. C. variegatus (variegated).* *l.* narrow, from 3ft. to 6ft. or more in length, slightly pendulous, armed with white spines on the edges, and reversed ones at the back of the midrib; ground colour bright green, with bands of pure white extending from base to apex. Java, 1875. A plant of great beauty. SYN. *P. javanicus variegatus.* See Fig. 17.

P. Candelabrum (candelabra-formed), of Bot. Mag. A synonym of *P. utilis.*

P. caricosus (Carex-like). *fl.* yellowish-white; inflorescence erect, terminal, dense, about 8in. long by 2½in. thick; bracts the same colour as the flowers. *l.* narrow, channelled, glaucous, not very spiny. Moluccas, 1879. Shrub of rather dwarf habit, branching at base. (R. H. 1878, 84.)

P. ceramensis (Island of Ceram). A synonym of *P. conoideus.*

P. conoideus (conoid).* *l.* forming a neat, spreading tuft, dark green, elegantly arched, of moderate length, carinate, spiny on the margin, and on the two secondary ridges of the upper surface, while the keel is smooth. New Caledonia, &c., 1872. A small, freely-branching tree, about 14ft. high. SYNS. *P. ceramensis, P. decorus.*

P. decorus (becoming). A synonym of *P. conoideus.*

P. elegantissimus (very elegant). A synonym of *P. utilis.*

P. flabelliformis (flabellate). A synonym of *P. utilis.*

P. fœtidus (stinking). *fl.*, partial racemes or thyrses of the male flower simple. *fr.* wedge-shaped, angular, single. *l.* as in *P. odoratissimus*, but smaller. India, 1842. Plant usually in the form of a thick, impenetrable bush, 5ft. to 6ft. high.

P. furcatus (forked). *l.* bright green, broadish, very much acuminated, armed both on the margins and on the keel with sharp spines, the lower of which are curved, and those near the point straight, greenish at first, and becoming brown as they mature. India and Indian Archipelago, 1824. A very handsome tree, somewhat rare in cultivation. The specific name, *furcatus*, alludes to the little forked spine with which the drupes are crowned. SYN. *P. Lais.* See Fig. 18.

P. glaucescens (glaucescent).* *l.* spreading, glaucous, and densely packed, armed with white spines, and terminated by a long point. 1865. India. An elegant, herbaceous plant.

P. graminifolius (grass-leaved). *l.* 12in. to 18in. long, three to four lines wide; margins densely, and rib beneath sparingly, spinulose; spines minute, straight. *h.* 2ft. Tenasserim. A pretty, dwarf-growing shrub, very useful for table decoration, &c.

FIG. 18. PANDANUS FURCATUS (much reduced).

P. Blancoi (Blanc's). A synonym of *P. odoratissimus.*

P. Candelabrum. Candelabrum or Chandelier Tree. *l.* about 3ft. long and 2in. wide, dark green, armed at the edges with brown spines. Guinea, 1826. This species, in its native habitat, "forms a magnificent branching tree, attaining a height of

P. graminifolius (grass-leaved), of gardens. A garden name for a species of *Freycinetia.*

Pandanus—*continued.*

P. heterocarpus (variable-fruited).* *l.* broad, from 3ft. to 6ft., or even more, in length, of a dark shining green above, lighter or somewhat glaucous beneath, armed at the margins and the back of the midrib with short, white spines. Philippines, 1866. A very handsome and ornamental species. SYN. *P. ornatus*, of gardens.

P. Hornei (Horn's). A synonym of *P. Houlletii.*

FIG. 19. PANDANUS HOULLETII.

P. Houlletii (Houllet's).* *l.* from 4ft. to 5ft. long, 3in. wide, carinate, spinescent on the margin and keel, contracted rather suddenly at the summit into a triangular, cuspidate point, 6in. to 8in. long, and of a greenish-red above and deep coppery beneath. Singapore, 1868. An elegant species. SYN. *P. Hornei.* See Fig. 19. (R. H. 1868, 210.)

P. javanicus variegatus (Javanese variegated). A synonym of *P. Candelabrum variegatus.*

P. Lais (Lais). A synonym of *P. furcatus.*

P. mauritianus (Mauritian). A synonym of *P. utilis.*

P. minor (lesser).* *fr.* sub-erect, as large as the fist, composed of about 150 yellow drupes; drupes with a hemispherical top, terminated by a short, brownish, claw-like spine. *l.* sub-distichous, 1½ft. to 2ft. long, gracefully recurving, keeled, the margins spinulose. Stems slender, about 3ft. long, prostrate. Bengal, 1878. (B. M. 6347, under name of *P. unguifer.*)

P. odoratissimus (very odorous).* *fr.*, drupes 2in. long, seventy to ninety in an oblong-elliptical, drooping head, 6in. to 10in. long. *l.* in drooping tufts, terminating the short branches, bright green, 3ft. to 5ft. long, armed with short, white spines.

Pandanus—*continued.*

FIG. 20. PANDANUS ODORATISSIMUS.

h. 20ft. Tropical Asia. A slender tree. The specific name is owing to the odour exhaled by the male inflorescence; a scent, much esteemed in Java, &c., is obtained from it. SYN. *P. Blancoi.* See Fig. 20.

P. odoratissimus (very odorous). A garden synonym of *P. utilis.*

P. ornatus (adorned). A garden synonym of *P. heterocarpus.*

FIG. 21. PANDANUS UTILIS.

Pandanus—*continued.*

P. Pancheri (Pancher's).* *l.* linear, 3ft. to 5ft. long and about 2in. broad; margins spinose-toothed, carinate beneath; the lower half of the carina reddish, and strongly spinose-toothed. New Caledonia, 1878. SYN. *Barrotia Pancheri.* (I. H. 288.)

P. polycephalus (many-headed). *l.* long, narrow, glaucous, spreading in elegant curves, and furnished at the head and keel with spines, the former pointing backwards, the latter forwards. Philippine Islands, 1866. A graceful perennial, of rather dwarf habit. SYN. *P. Porteanus.*

P. Porteanus (Porte's). A synonym of *P. polycephalus.*

P. pygmæus (pigmy). *fl.* on a short, erect peduncle, buried among the upper leaves. *l.* at the extremities of the branches, about 1ft. long, spirally arranged in threes, from an amplexicaul, broad base, linear-subulate, the margins and keel fringed with white, spinulose serratures. Madagascar. A low-spreading shrub, not 2ft. high in the centre, but from the base sending out numerous branches in all directions. (B. M. 4736.)

P. reflexus (reflexed). *l.* pendulous, or bent back, from 4ft. to 6ft. long, dark shining green, armed with long, white spines on the edges, and reversed ones on the under side of the midrib. India, 1818.

P. utilis (useful).* *fr.* in long, trigono-globose, long-peduncled, pendulous heads, about 6in. in diameter, containing 100 drupes about 1½in. long. *l.* glaucous, erect, 1ft. to 2¾ft. long, armed with sharp red spines. *h.* (in its native place) 60ft. Madagascar. See Fig. 21. (I. H. 1860, 265.) SYNS. *P. Candelabrum* (B. M. 5014), *P. elegantissimus, P. flabelliformis* (R. H. 1866, 271,), *P. mauritianus* (I. H. 1860, 265,), *P. odoratissimus* (of gardens).

P. Vandermeeschii (Vandermeesch's).* *fr.* in trigono-globose heads, containing over 100 fusiform drupes, 1in. long; peduncle often red. *l.* stiff, sub-erect, 2½ft. to 3ft. long, 1½in. to 2in. broad, very glaucous, the thickened, red margins armed with strong, red, pungent spines; midrib red, prominent, also spiny. Stem light in colour, 5in. to 6in. in diameter. *h.* 20ft. Mauritius. Tree.

P. Veitchii (Veitch's).* *l.* broad, 2ft. long, somewhat pendulous, spiny, of a dark green in the centre, and bordered with broad bands of pure white. Polynesia, 1868. A very beautiful plant. (R. G. 1872, 310.)

PANDOREA. Included under **Tecoma** (which *see*).

PANDURATE, or **PANDURIFORM.** Fiddle-shaped; obovate in form, with one or two deep recesses

FIG. 22. PANDURATE LEAF.

or indentations on each side. A Pandurate leaf is shown at Fig. 22.

PANGIACEÆ. Included under *Bixineæ.*

PANICLE. An inflorescence having the axis divided into branches bearing two or more flowers.

PANICUM (the old Latin name, derived by Pliny from *paniculum*, a panicle; alluding to the usual form of inflorescence). Panick-Grass. SYN. *Thalasium.* ORD. *Gramineæ.* An extensive genus of stove, greenhouse, or hardy, annual or perennial grasses, of variable habit, chiefly natives of tropical and sub-tropical regions of the globe. Nearly 800 supposed species have been described, but the total number fairly distinct as such can scarcely be estimated at much above 250 (Bentham). Many supposed genera, amongst which are *Digitaria* and *Echinochloa*, have been at times separated from *Panicum*, but these are now united by the authors of the "Genera Plantarum." Spikelets ovate, acuminate or obtuse, rarely globose, articulated with the pedicels, loosely or densely paniculate, or in undivided spikes with a terminal hermaphrodite flower, and usually a lower male one; glumes usually four, much shorter than the spikelets, in a few species evanescent; stamens (? always) three; style distinct, or shortly connate at base; stigma feathery. Several members of this genus are of economic value, but few are found in gardens. Two species—*P. Crus-galli* and *P. glabrum*—are British. The under-mentioned are hardy, except where otherwise stated, and thrive in any moderately good garden soil. Propagated by seeds.

Panicum—*continued.*

P. altissimum (very tall). *fl.*, panicle large, 1ft. to 1½ft. long, all the branches whorled, simple, racemiform, naked below. *l.* 1ft. to 1½ft. long, lanceolate-linear, acuminate, glabrous. *h.* 6ft. to 30ft. West Indies, &c. Plant woody, arborescent.

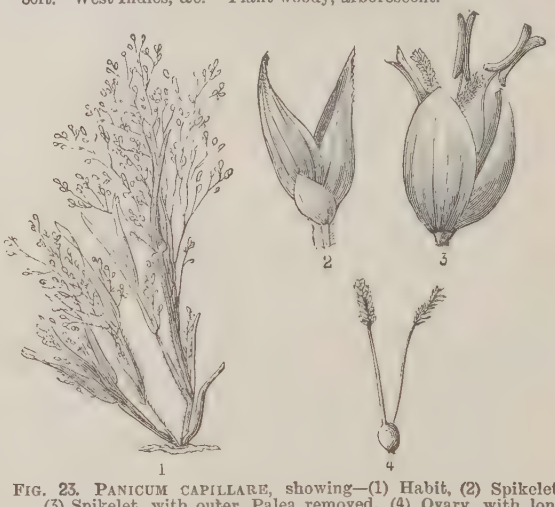


FIG. 23. PANICUM CAPILLARE, showing—(1) Habit, (2) Spikelet, (3) Spikelet, with outer Palea removed, (4) Ovary, with long Style and Plumose Stigmas.

P. capillare (hair-panicled).* *fl.*, panicles large, pyramidal, produced in great profusion, and borne both at the ends of the stems and in the axils of the stem-leaves. Summer. *h.* 1½ft. to 2ft. Europe, Asia, North America, 1758. A pretty annual. See Fig. 23.

P. colonum (colonial). *fl.*, spikelets four to six-seriate, very shortly pedicellate, scabrous-pubescent; sterile glumes mucronate, the lowest short, the two superior equalling or shortly exceeding the fertile flower; spikes ½in. to 1in. long. *l.* linear, acuminate, glabrous. *h.* 1ft. to 1½ft. West Indies, &c. Half-hardy annual.

P. italicum (Italian). *fl.* in a panicle, about 1in. in diameter; cylindrical, at length nodding at the summit; spikelets elliptical-oblong. *l.* broad. Branches contiguous with, or a little distant below, the panicle, ovate or oblong. *h.* 2ft. to 4ft. West Indies. A tall annual, now naturalised in many European and other countries.

P. maximum (largest). *fl.*, spikelets elliptic-oblong, glabrous; lowest glume short, the two upper ones little exceeding the fertile flower; panicle 1in. to 1½in. long, the lower branches whorled, usually bearing a few bristles. *l.* linear or lanceolate, acuminate, ciliated at the base and ligule; nodes usually villous. *h.* 5ft. to 10ft. West Indies, &c. A stout, stove perennial.

FIG. 24. PANICUM MILIACEUM, showing—(1) Habit, (2) Spikelet, (3) Inner Palea, (4) Ovary, with long Style and Branched Stigmas, (5) Stigma, and (6) Grain.

P. miliaceum (Millet-like).* Little Millet. *fl.* in a much-divided, nodding panicle; spikelets numerous, pedicellate, ovoid. *l.* rather broad, hairy. *h.* 2ft. An erect annual, cultivated in the Mediterranean region. See Fig. 24.

Panicum—*continued.*

P. plicatum niveo-vittatum (plaited, snowy-striped).* *l.* finely banded with longitudinal stripes of pure white, broad-plaited. 1868. A prettily marked, strong-growing, garden variety, thriving in the stove or greenhouse. (F. d. S. 1743-4.)

P. spectabile (remarkable). Caapim de Angola. *fl.*, spikes numerous, the superior ones exceeding their internodes; spikelets four to six-seriate. *l.* long, lanceolate, acuminate, glabrescent. Jamaica, Brazil, &c.

P. variegatum (variegated).* *l.* white-striped and pink-tinted, lanceolate, with gracefully-waved margins. Tropical Asia, &c., 1867. An elegant little greenhouse variegated perennial, extremely pretty when grown in a basket. It should be kept in heat during winter. Propagated freely from cuttings. The correct name of this plant is *Oplismenus Burmanni variegatus.*

FIG. 25. PANICUM VIRGATUM.

P. virgatum (twiggy).* *fl.*, panicle branches at first erect or ascending, afterwards extensively spreading or drooping. Summer. *l.* linear, flat, very long. *h.* 3ft. to 5ft. North America, 1781. A very ornamental perennial species, growing in large, handsome tufts. See Fig. 25.

PANNOSE. Resembling coarse cloth in texture or appearance.

PANSY (*Viola tricolor*). Under the name of Heartsease, and several other popular designations, this plant has long been grown in gardens, where its flowers have been amongst those most generally favoured by rich and poor alike. This can scarcely be wondered at, considering the ease with which Pansies may be grown by almost anyone, the wonderful diversity in colour and marking which the different flowers exhibit, and the ornamental and floriferous habit the plants assume. Even those who are not sufficiently interested in Pansies to grow a collection of named varieties, may procure a packet of mixed seeds, and raise any quantity of plants, that will scarcely be less ornamental for the hardy flower garden or mixed border.

Propagation. Pansies are readily multiplied by seeds, cuttings, and, sometimes, by layers. Seeds may be sown at almost any time of year; but, as planting out is best performed in spring or early autumn, it is advisable to sow with a view to preparing plants for these two seasons—namely, in June for transplanting in autumn, and in August or September, for spring. The seeds should be sown in pans of light soil, covered slightly, and placed in a very gentle heat, or in a cold frame. They soon germinate, and the seedlings, when large enough to handle, should be pricked out in an unheated frame, or in boxes. Before planting outside, it is important that good roots be formed, and that balls of soil should adhere to them; on this condition, much of the after-success depends. Pansy cuttings strike readily towards the latter part of summer, in cold frames, or in a cool, shady border, such as that alongside a wall or hedge, facing north. Side-shoots are to be preferred for cuttings; they may frequently be procured from the base with roots already formed. The soil should be of a sandy nature, and it should be pressed firmly around the cuttings at the time of inserting. Plants so obtained may be placed in their permanent quarters in autumn, or in a prepared border, with a view to lifting them again with better roots and with balls of soil. Layering may be recommended for increasing good varieties that produce but few base shoots; and division of the old plants, in August and September, is, in some instances, a profitable method, because such a quantity of rooted plants may be obtained. Where a large stock of Pansies has to be kept up, it will be necessary to keep inserting cuttings all through the season.

Pansy—*continued.*

Cultivation. Pansies, for ordinary garden decoration, will thrive in almost any soil, without special treatment, provided the position is neither too hot nor too dry. It is principally on account of their preference for a cool, moist bottom that the plants succeed so much better, generally, in the northern parts of Britain than in the southern. If good culture and generous treatment are accorded by the special preparation of beds for, at least, all the choicer varieties, flowers of greater size and substance may be obtained, and the flowering season may also be considerably prolonged thereby. This becomes well-nigh a necessity, if exhibiting is attempted, as only large flowers with all their qualities properly developed are of any use. Fibry loam, thoroughly decomposed cow-manure, or horse droppings, and some sharp sand or road grit, should be used for digging in with the ordinary soil, which it is essential should also be of a good depth. A mulching of old potting soil, leaf mould, and other manure may be given as a top-dressing, so soon as the flowering season begins, and again later on. Such mulchings have a wonderful effect in dry, hot weather by keeping the ground cool, and, to a great extent, preventing evaporation. Deep planting is also recommended, as it places the roots in a much cooler and more moist medium than if they were near the surface. A position neither too much exposed to the mid-day sun, nor over-shadowed by trees, should, if possible, be selected for growing Pansies, when fine flowers are desired. When a southern aspect is, for some reason, unavoidable, a light shading of tiffany is sometimes employed for a few hours each hot day along the sunny side. Strong plants for early flowering, placed in their permanent quarters in September, should be protected, in case of severe weather, with some light litter. Spring planting should be attended to as early as weather permits, say, the end of February, or early in March, in order that the roots may become the better established before hot weather arrives. When watering is necessary in summer, a good soaking should be given, and this only in the evening. Slight waterings are frequently more injurious than beneficial. If flowers for exhibition are required, only about four or six main shoots should be allowed each plant; others being pinched off occasionally as they are formed. All blossoms may also be removed until about three weeks before a show; this tends to strengthen the plants, and increase the size of their flowers.

Culture in Pots. Where this method of growing Pansies is adopted, strong plants should be inserted in 4in. pots early in October, and be placed in a cold frame, with a south aspect. Plenty of air and light are essential. During mild weather, the sashes should be removed: when it is frosty, coverings are preferable to artificial heat. In February, the plants should be transferred into 7in. or 8in. pots, using plenty of drainage, and a rich, open soil. By keeping the shoots tied out, and the flower-buds pinched off, good plants soon develop. From April onwards, frames with a northern aspect would be better, on account of being cooler.

Varieties. Of these the number may almost be said to be legion, so great a variation in colour and markings do the plants represent. See Fig. 26. There are two sections

Pansy—*continued.*

into which Pansies are divided, namely, Fancy and Show. Varieties of the latter are further sub-divided, according to the colour of their flowers, into three classes, termed respectively Selfs, White Grounds, and Yellow Grounds. The Selfs are either black, maroon, primrose, white, or yellow. White Grounds have a large, central, dark blotch round the eye, then a ring, either of white or cream-colour, and an outer band of bronze, purple, or maroon. Fancy, or Belgian, Pansies have various colours and tints curiously blended in their different flowers, the petals being blotched, flamed, and edged, and quite distinct from those of the Show section. A third section is sometimes made on behalf of Bedding varieties. These are usually self-coloured, and are distinguished by their compact and floriferous habit, and, as a rule, rather small flowers. They are more the offspring of *V. cornuta* and

FIG. 26. PANSY (*Viola tricolor*).

V. lutea than of the Pansy, *V. tricolor*, and are more generally known as Violas. The line of demarcation, however, between a Viola and a Pansy is now practically undefinable. Subjoined is a list, which comprises varieties of Fancy and Show Pansies of excellent quality in every respect; some new ones of 1885 are denoted by daggers (†). For a selection of floriferous Bedding varieties, *see* **Viola.**

Fancy Pansies.

ALEXANDER GRANT,† dense brown blotches; upper petals bright yellow, margined and flaked crimson. ALEX. KIRK, yellow, with mulberry blotches on all the petals. ALEX. M'COMB, violet blotches; upper petals and margins claret; distinct and fine. BEAUTY,† dark rosy-crimson blotch; side and upper petals laced with white; fine form. CAMPBELL-BANNERMAN, white, purple blotches; upper petals purple-edged; fine. CAPTAIN HOUSTOUN, mulberry blotches; upper petals crimson; large. CATHERINE AGNES, purple, edged white. COLINSBURGH,† yellow, dense maroon blotches; extra. COLONEL WELSH, mulberry blotches; upper petals violet, primrose margin; fine form. DAVID FINDLAY, dark violet blotches; upper petals claret, primrose margin. EFFIE WELSH, violet blotches on all the petals, white margin. EVELYN BRUCE, blotches mulberry; upper petals yellow, with crimson margins; extra. JAMES GRIEVE,† yellow, flaked with red, dense, dark blotches; large; extra good. JOHN GOLD, pale crimson, dense, black blotches. MAGGIE COCHRAN,† blotches bluish-purple, edged white; upper petals white, rayed rosy-purple; extra. MARTHA M'INTOSH,† dense blue blotches; upper petals puce, edged white; fine eye. MAY FERGUSON,† blotches dark blue; upper petals white, flaked purple, edged pure white. MAY TATE, yellow, shaded red. MISS BLISS, yellow self, dense blotches; extra. MRS. DALGETY, upper petals and blotches violet, white lacing. MRS. G. P. FRAME, dark blotches, shaded crimson, white lacing. MRS. HUTT, yellow self, dense mulberry blotches; extra. MRS. M. H. MILLER, upper petals flamed carmine, edged gold. MRS. T. M'COMB, mulberry blotches; upper petals purple; extra. MRS. W. D. BLACK,† rich maroon blotch; upper and side petals shaded rosy-purple, edged with white. MRS. WELSH, very dark violet self, pure white margin; extra fine. MRS. WM. M. WELSH, violet blotch, edged carmine; distinct. PERFECTION, mulberry blotch; upper petals violet. PILRIG,† mulberry blotches; fine eye; upper petals yellow, margined with crimson. PLORA GEM, dense, dark blotches, clear white margin round all the petals. ROYAL QUEEN, deep orange, edged rosy-purple; one of the largest fancies. SUNBEAM, light cream self, with solid blue blotches; fine. T. M'COMB, rich crimson; extra. WM. CUTHBERTSON, yellow, shaded crimson. WM. DICK,† dense maroon blotches, fine eye, margined with golden yellow. WM. HOWIE†, dense maroon blotches; upper petals flaked crimson and orange, golden-yellow edge; extra fine.

Pansy—*continued.*

Show Pansies.

Class I. Selfs.—A. FOX, dark and smooth. BLACK PRINCE, very dark; fine form. COUNTESS OF ROSEBERY,† primrose, dark blotch and eye; extra fine. DR. GRAY, azure-blue, dense blotch, distinct. GOMAR, deep yellow; fine. ISA CRAIG, primrose, dense blotch. ISA SMITH, cream; very smooth. JAMES SKINNER,† rich mulberry, fine eye; one of the best of its class. JANEY ANDERSON, white, large. JOHN DONALDSON, velvety-maroon. LEITH WALK BEAUTY, dark mulberry. MRS. DOBBIE, white, smooth. MRS. GOODALL, white, dense blotch. MRS. TOM SMITH,† pure white, large; fine for competition. PARAGON,† rich yellow, fine blotch; extra. PILRIG GEM, maroon. PRIMROSE GEM,† primrose, dense solid blotch, fine eye; distinct and constant. ROBERT BLACK, black; extra. W. J. CLARK, white, solid blotch; good substance.

Class II. White Grounds. DEVONIA, purple belt. JANE GRIEVE, purple belt; extra fine. JESSIE FOOTE, purple belt. JOHN CLARK, dark purple blotch and belt; fine exhibition flower. LIZZIE DONALDSON,† large, white circular field, fine dark purple belt; extra fine. M. H. MILLER, violet-purple belt, solid blotch; fine. MISS KATE SUTHERLAND, dark purple belt; fine show flower. MRS. A. PEEBLES, violet-purple belt, large; of fine form. MRS. GLADSTONE, rich purple belt; fine form. MRS. J. BUSH,† white, solid purple belt; fine form and substance. MRS. R. LAIDLAW, purple belt. MRS. TODD, cream, dark purple belt. N. H. POWNALL, purple belt; extra. THE MEDE, broad purple belt.

Class III. Yellow Grounds. ALEX. SMITH,† medium shade of yellow, dark purple belt; good form and substance. CHANCELLOR, gold, maroon belt. DR. ROBERTSON, yellow, maroon belt. ELLA MURRAY, yellow, bronze belt. JAMES COOK, golden-yellow ground, yellow-ruby belt; extra. J. B. DOWNIE, bronze belt. LORD F. CAVENDISH, deep golden-yellow ground, rich bronzy-purple margins; flowers very large. MARY M'COMB, maroon belt. PILRIG KING, mulberry blotch, reddish-bronze belt; fine. R. DONALDSON, maroon belt; fine. ROBERT BURNS, lemon, chocolate belt; large, constant. T. M'COMB, purple belt; large.

PAPAVER (the old Latin name, used by Pliny, &c.). Poppy. ORD. *Papaveraceæ*. A genus comprising about fourteen species of hardy or half-hardy, hispid or glaucous, annual or perennial herbs, with milky juice; one is South African, another extra-tropical Australian, and the rest are found in the temperate or sub-tropical regions of Asia, North Africa, and Europe; four are truly natives of Britain, and a fifth—the Opium Poppy—is naturalised here and there. Flowers red, violet, yellow, or white, showy; sepals two, rarely three; petals four, rarely six; stamens many; peduncles elongated; flower-buds nodding. Leaves usually lobed or dissected. The cultivation of this genus is very simple, the most suitable soil being a sandy loam. The species and varieties are admirable subjects for borders, and for naturalising in woody spots. Propagation is freely effected by seeds, or by divisions. All the plants described below are hardy.

P. alpinum (alpine).* *fl.* yellow, rose-tinted, or white; sepals covered with long, adpressed hairs. Summer. *l.* hispid or glabrous, once or twice pinnatisect, with narrow, sub-linear or elliptic lobes; hairs spreading or adpressed. *h.* 6in. From a botanical point of view, this and *P. nudicaule* are really but one species; in cultivation, however, *P. alpinum* is a dwarfer, more slender plant, and has, generally, citron-yellow flowers.

P. bracteatum (bracteate).* *fl.* red, bracteate; sepals scabrous. May. *l.* or bracts pinnati-partite, hispid; lobes oblong, serrated, deeply incised. *h.* 4ft. Caucasus, 1817. Strictly speaking, this is only a marked variety of *P. orientale*. See Fig. 27. (B. M. 658; L. C. B. 23.)

P. Hookeri (Hooker's).* *fl.* varying from pale rose to crimson-scarlet, with a diffused white or blue-black blotch at the base; stigmatic rays twelve to twenty. Autumn. India, 1884. An ornamental plant, resembling *P. Rhœas* in general aspect, but forming a large bushy herb 3ft. to 4ft. high. (B. M. 6729.)

P. horridum (horrid). *fl.* brick or red-colour; sepals hispid. July. *l.* sub-amplexicaul, glaucous, sinuato-pinnatifid, the lobules prickly at the apices and on the nerves. Stem few-flowered, with rigid prickles, very hispid. *h.* 2ft. Australia and South Africa, 1825. (S. B. F. G. 173; B. M. 3623, under name of *P. gariepinum*.)

P. lateritium (brick-red). *fl.* bright orange, about 2in. across, with obovate petals, and sepals covered on the back with long yellow hairs. May. *l.* linear-elliptical, pinnatifid at the base; those of the root densely crowded together, 6in. to 12in. long,

Papaver—*continued.*

and ½in. or more broad; the lower segments much divided, the upper ones few and coarsely serrated; stem leaves much smaller and nearly sessile. *h.* 1½ft. to 2ft. Armenia.

P. nudicaule (naked-stemmed).* *fl.* bright orange, yellow, or white, large and very showy, with nearly orbicular petals, and rather pilose sepals. Summer. *l.* pinnate, glaucous; segments finely cut into acute lobes. *h.* 9in. to 18in. Mountains of Northern hemisphere, 1759. A beautiful alpine perennial. (S. B. F. G. 247.)

P. n. croceum (golden). *fl.* orange-yellow or saffron, large and showy, with the petals slightly waved at the margin. Summer. *l.* erect, glaucous underneath, delicate green on the upper side, rough, with spreading hairs. *h.* 8in. to 15in. Siberia, 1829. A pretty perennial, resembling *Meconopsis cambrica* in habit. (B. M. 2344, under name of *P. croceum.*)

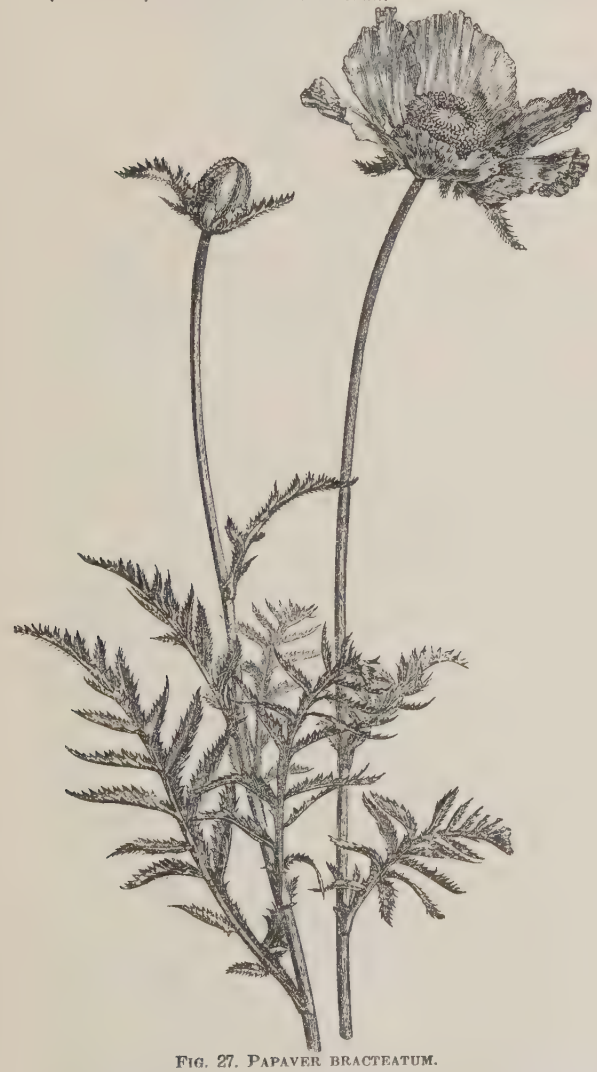


FIG. 27. PAPAVER BRACTEATUM.

P. orientale (Eastern).* *fl.* deep scarlet, usually with a dark purple spot at the base of each petal, 6in. or more across; sepals three. Early summer. *l.* pinnate, about 1ft. long, clothed with white bristly hairs. Stem rough and leafy. *h.* 2ft. to 3ft. Armenia, 1714. A well-known plant, and one of the showiest of hardy perennials. (B. M. 57.) There are several more or less distinct varieties, including *concolor*, which has no spots at the base of the petals; and *triumphans*, a very floriferous and dwarfer habited form.

P. pavonium (peacock-like). *fl.* scarlet, with a black horseshoe-shaped blotch at the base of each petal; ovary and capsule setose. Summer. *l.* rather small, bipinnatifid. Central Asia, 1883. (R. G. 1095, f. 3-4.)

Papaver—*continued.*

P. persicum (Persian). *fl.* brick-red; sepals setose. June. *l.* pinnatifid, setose; segments almost undivided, often aristate. Stems leafy, paniculate. *h.* 1½ft. Persia, 1830. (B. R. 1570.)

P. pilosum (pilose).* *fl.* pale lurid scarlet, or intense orange, with a white mark at the bottom of each petal. Stem many-flowered, with spreading hairs. Summer. *l.* stem-clasping, cut, pilose on both surfaces. *h.* 1ft. to 2ft. Bithynia and Mount Olympus. Plant about the size of *P. somniferum*, but pale green, not glaucous. A very showy perennial. (B. M. 4749, under name of *P. nudicaule.*)

FIG. 28. PAPAVER RHŒAS FLORE-PLENO.

P. Rhœas (common field).* Common Corn Poppy, Redweed, Wind Rose, &c. *fl.* brilliant scarlet, large. Stem many-flowered, scabrous, with spreading bristles. Summer. *l.* pinnate-parted, the lobes elongated and deeply toothed, acuté. *h.* 1ft. Europe (Britain), North Africa, West Asia. (Sy. En. B. 58.) This well-known annual has produced innumerable varieties under cultivation, both double (see Fig. 28) and single. The garden strains, respectively known as the Carnation, Picotee, and Ranunculus-flowered Poppies, are double forms of this species.

FIG. 29. PAPAVER DANEBROG.

P. R. umbrosum (shaded).* *fl.* of a dazzling scarlet, with a jet-black blotch on the inner base of each petal, which is sometimes margined with ashy-grey; scapes long, one-flowered. Summer. *h.* 2ft. Caucasus, 1877. (G. C. n. s., xxii. 49.)

Papaver—*continued.*

P. setigerum (bristly). *fl.* violet; capsule obovate, not stipitate. Summer. A near ally of the Opium Poppy, but differing from it in having the teeth of the leaves terminating in a stiff bristle, and in the simple or slightly branched stem ending in two or three elongated peduncles, which, as well as the leaves, are hairy. *h.* 1ft. to 2ft. Europe, Asia. (S. B. F. G. 172.) Of this Poppy, numerous fine strains have originated in gardens.

FIG. 30. PAPAVER MURSELLI.

P. somniferum (sleep-causing).* Opium Poppy. *fl.* variously coloured, white, rose, lilac, violet, often striped, and usually with a darker spot at the base of the petals, the latter fringed in some varieties. Stem many-flowered, smooth. July. *l.* oblong-amplexicaul, sinuate, glaucous, broad, waved, lobed, cordate at the base. *h.* 3ft. to 4ft. Europe, Asia, West Africa, India, and naturalised in many parts of this country. Annual. (B. M. Pl. 18). Opium is the inspissated milky juice of this species, obtained by making incisions in the capsule. The seeds are destitute of narcotic quality, and may be eaten; they are sold as birds' food, under the name of Maw Seed. The name *pæoniæflorum* is given in gardens to a select strain of this species with very double, Pæony-like flowers. What is grown in gardens under the name of Danebrog Poppy (see Fig. 29), is also a strain of this species. *P. Murselli* is another garden strain, with double flowers and fringed petals (see Fig. 30).

PAPAVERACEÆ. A natural order of glabrous and often glaucescent, or long-pilose, herbs, or very rarely small shrubs, mostly inhabiting the temperate, cold, and sub-tropical regions of the Northern hemisphere, only a few being found within the tropics or in the Southern hemisphere. Flowers hermaphrodite, regular or (in *Fumarieæ*) irregular; sepals two or three, rarely four, free, imbricated, very caducous; petals four or six, rarely eight or twelve, free, in two, or rarely three, series, imbricated and frequently corrugated, deciduous; stamens hypogynous, free, or the filaments connate; peduncles one-flowered, or very rarely sub-umbellately many-flowered, usually elongated, terminal or in the upper axils. Fruit a capsule. Leaves alternate, or the floral ones occasionally sub-opposite, entire, or often lobed or dissected, exstipulate. Many of the species contain coloured juices. The most important product, however, is opium, prepared from the milky juice of *Papaver somniferum*; this species is also cultivated in France for its seeds, which yield what is known as white oil or oleum. The order comprises twenty-five genera and about 160 species. Well-known examples are: *Eschscholtzia*, *Fumaria*, *Papaver*, and *Platystemon*.

PAPAW-TREE. *See* **Carica Papaya.**

PAPAYA. Included under *Carica.*

PAPAYACEÆ. A tribe of *Passifloreæ.*

PAPER MULBERRY. *See* **Broussonetia papyrifera.**

PAPER REED OR RUSH. *See* **Papyrus antiquorum.**

PAPER-TREE. *See* **Streblus asper.**

PAPHINIA. Included under **Lycaste** (which *see*).

PAPILIONACEÆ. A sub-order of *Leguminosæ*, spread over the whole world, but principally inhabiting the North temperate hemisphere. There are some 295 genera, and about 4700 species. All the British, and, with two exceptions, all the European, members of *Leguminosæ* belong to this sub-order. For the chief botanical characteristics, *see* **Leguminosæ.**

FIG. 31. PAPILIONACEOUS COROLLA.

PAPILIONACEOUS. Having a corolla similar to that of the Pea. See Fig. 31.

PAPILIONIDÆ. A family of Butterflies, some species of which are injurious to cultivated plants. The family marks are: that the perfect insects are moderately large, the wings spreading from 1½in. to 4in. across, and all six legs are useful for walking; the larvæ are long, nearly cylindrical, and naked, or only slightly hairy; and the pupæ are fixed to supports by both a belt of silk round the middle and a silk cord at the tail. The family includes eleven British species, and among these are the largest British butterfly, viz., the Swallow-tail, which lives in the Fen Counties of England, feeding on Umbellifers. Other well-known species are the Brimstone Butterfly, the Clouded Yellows, the Orange Tip, and the various White Butterflies. These last alone are hurtful in gardens. The larvæ of the Large White (*Pieris Brassicæ*) and the Small White (*P. Rapæ*) do great injury to Cabbages (*see* **Cabbage Caterpillars**), and those of the Black-veined White (*Aporia Cratægi*) feed on Hawthorn, and on Apple and Pear-trees (*see* **Hawthorn Caterpillars**).

PAPILLÆ, or **PAPULÆ.** Soft, oblong, superficial glands.

PAPPUS. A term applied to various hairy tufts on achenes or fruits; or to the mere rim, scales, or hairs, to which the calyx is reduced in *Compositæ.*

PAPULÆ. *See* **Papillæ.**

PAPYRACEOUS. Of the consistency of writing-paper.

PAPYRIA. A synonym of *Gethyllis.*

PAPYRUS (from *Papuros*, an old Greek name, of Egyptian origin, used by Theophrastus). ORD. *Cyperaceæ.* A small genus of sedges, mostly stove aquatic perennials, natives of tropical and warm regions, included, by Bentham and Hooker, under *Cyperus.* Inflorescence in many-flowered spikelets, surrounded by long bracts; glumes imbricated, in two rows, one-flowered. The only species requiring mention here is *P. antiquorum.* It is usually cultivated as an aquatic, but may be grown in a pot of rich, heavy loam, if kept standing in a pan or tub of water. For sub-tropical gardening, it is a very useful subject, and is best grown in shallow water, in a warm position. It should be removed indoors early in the month of September. Propagated by divisions of the rhizome.

P. antiquorum (ancient).* Egyptian Paper Reed or Rush. Stems dark green, triangular, jointless, supporting, at the top, an umbel of pendent leaves, which impart a very graceful and striking appearance. *h.* 10ft. Egypt, 1803. "The pith-like

Papyrus—*continued.*

tissues of the larger flowering-stems, cut into thin strips, united together by narrowly-overlapping margins, and then crossed, under pressure, by a similar arrangement of strips at right angles, constituted the papyrus of antiquity" (Oliver). The proper name of this plant is *Cyperus Papyrus.*

PARACARYUM (from *para*, beside, and *karyon*, a nut; in reference to the position of the nutlets). SYN. *Omphalodes* (in part). ORD. *Boragineæ*. A genus comprising about ten species of mostly hardy, biennial or perennial, cano-pubescent, hirsute, or rarely setose-hispid herbs, natives of South Europe and Central Asia. Flowers violet or blue, rather small, pedicellate or sub-sessile; calyx five-parted or deeply five-cut; corolla funnel-shaped, with a short or rather long tube, and five imbricated, obtuse, short, erect or spreading lobes; racemes elongated, ebracteate, or few-bracted at base, sometimes loose and broadly paniculate. Nutlets four, depressed at back. Leaves alternate. The species best known in gardens are those described below, for culture of which *see* **Cynoglossum.**

P. anchusoides (Anchusa-like). *fl.*, corolla tube purplish, cylindrical, the limb blue, sub-patent; pedicels extra-axillary, shorter than the calyx; panicles loosely branched, elongated, naked at apex. May. *l.*, radical ones lanceolate, long-stalked; cauline ones linear-lanceolate, sessile. *h.* 2ft. Cashmere, 1840. (B. R. 1842, 14, under name of *Cynoglossum anchusoides.*)

P. cœlestinum (celestial-blue). *fl.*, corolla blue, margined with white; fructiferous pedicels reflexed, shorter than the calyx; racemes ebracteate, often twice bifid. August. *l.*, radical ones petiolate, cordate-ovate, sub-acute; cauline ones ovate, acute, cuneate at base. *h.* 1ft. to 2ft. North India, 1837. (B. R. 1839, 36, under name of *Cynoglossum cœlestinum.*)

P. myosotoides (Myosotis-like). *fl.* loosely racemose; corolla blue, small, funnel-shaped, scarcely longer than the calyx. September. *l.*, radical ones spathulate-lanceolate; cauline ones sessile, linear-lanceolate, strigose, rough. *h.* 1½ft. Orient, 1838. Half-hardy.

PARADISANTHUS (from *Paradeisos*, park, Paradise, and *anthos*, a flower; in reference to the beauty of the plant). ORD. *Orchideæ*. A small genus, of uncertain affinity. Flowers white, curiously striped with deep purple; sepals oblong-lanceolate, acute, the two lateral ones slightly unequal at the base; lip shortly clawed, often pendulous; pollen masses four, depressed, pyriform. Leaves lanceolate, acute, green, sub-glaucous, twin. *P. bahiensis* and *P. Mosenii* are little, terrestrial, stemless orchids, rarely cultivated in England. *P. Mosenii* should be grown, suspended near the glass, in an intermediate house, and potted in a mixture of peat, sphagnum, and charcoal. During winter, very little water is required.

P. Mosenii (Dr. Mosen's). *fl.*, peduncle longer than the leaves; sepals green, with a few brown bars; lips white, with mauve stripes in the basilar hollow, having angles beneath; anterior part of the column purple. *l.* oblong, acute, grass-like. Pseudo-bulbs oblong, compressed 2in. long. Brazil, 1881.

PARADISE, GRAINS OF. A common name applied to the seeds of *Amomum Melegueta.*

PARADISIA (from *Paradeisos*, Paradise, of which the flower is supposed to be a suitable inhabitant). SYNS. *Allobrogia, Czackia, Hyperogyne, Liliastrum.* ORD. *Liliaceæ*. A monotypic genus. The species is a hardy, perennial herb, with a very short rhizome, and rather thick, fasciculate root-fibres. For culture, *see* **Antheri-cum.**

P. Liliastrum (Liliaster). This is the correct name of the plant described and figured in this work under name of *Anthericum Liliastrum.*

PARAGRAMMA. Included under **Polypodium** (which *see*).

PARAGUAY TEA. *See* **Ilex paraguariensis.**

PARANEPHELIUS. Included under **Liabum** (which *see*).

PARANOMUS. A synonym of **Nivenia** (which *see*).

PARAPETALIFERA. A synonym of *Barosma.*

PARASITIC. Growing into some other plant, and deriving its food from the juices of that plant.

PARASOL, CHINESE. *See* **Sterculia platinifolia.**

PARASOL FIR. *See* **Sciadopitys verticillata.**

PARASOL PINE. *See* **Pinus Pinea.**

PARASTRANTHUS. Included under *Lobelia.*

PARATROPIA. A synonym of **Heptapleurum** (which *see*).

PARCHMENT BARK. *See* **Pittosporum crassifolium.**

PARDANTHUS (from *pardos*, a leopard, and *anthos*, a flower; referring to the spotted flowers). ORD. *Irideæ*. A monotypic genus. The species is a hardy, tuberous-rooted, herbaceous perennial; it requires a rich, sandy-loam soil, and a sheltered situation in winter. Propagated, in spring, by seeds or by divisions.

FIG. 32. INFLORESCENCE AND LEAF OF PARDANTHUS CHINENSIS.

P. chinensis (Chinese). *fl.* orange-coloured, spotted with purple-brown, nearly 2in. across; perianth segments equal, spreading, narrowed at the base; tube very short. June. *l.* equitant, ensiform. Stem erect, leafy. *h.* 1½ft. to 2ft. China and Japan, 1823. See Fig. 32. (F. d. S. 1632; B. M. 171, under name of *Ixia chinensis.*) The genus *Pardanthus* is synonymous with *Belamcanda*, and the proper name of the plant here described is *B. chinensis.*

PARDUYNA. A synonym of **Schelhammera** (which *see*).

PARECHITES. A synonym of **Trachelospermum** (which *see*).

PAREIRA BRAVA. A name applied to *Chondrodendron tomentosum.*

PARIETES. The inside walls of any organ.

PARINARIUM (from *Parinari*, the native name of the plant in Brazil). SYNS. *Balantium, Exitelia, Lepidocarya, Maranthes, Petrocarya.* ORD. *Rosaceæ*. A genus comprising about thirty-three species of stove shrubs or trees, often tall, natives of the Indian Archipelago, North Australia, the Pacific Islands, tropical Africa, Brazil, and Guiana; one has been discovered in the Trinity Islands, and another in South Africa. Flowers white or pink, paniculate or racemosely corymbose, bibracteolate, hermaphrodite; calyx with a short or elongated tube, and five sub-equal, imbricated lobes; petals five, rarely four, inserted at the mouth of the calyx, sessile or unguiculate, deciduous. Fruit ovoid or spherical, sometimes edible. Leaves alternate, persistent, very frequently thick and coriaceous, eglandulose or biglandulose at the apex, entire; stipules subulate or lanceolate. Few of the species are known to cultivation. For culture of those described below, *see* **Chrysobalanus.**

P. excelsum (tall). Guinea Plum. *fl.* white, in panicled racemes. February. *fr.* about the size of "Impératrice" plums, with a coarse skin of a greyish colour; the pulp is dry and farinaceous, and, owing to the size of the stone, is small in bulk. *l.* oblong, coriaceous, deep green above, white with

Parinarium—*continued.*

pubescence beneath. Guinea, 1822. A large tree. This species is the "Grey" or "Rough-skinned Plum" of Sierra Leone.

P. macrophyllum (large-leaved). Gingerbread Plum. *fl.* white, in terminal racemes. February. *fr.* oblong, twice the size of that of the preceding species, which it much resembles in flavour and appearance. *l.* large, ovate, sessile, and cordate, green above and downy beneath. Stems thickly beset with brown hairs. Guinea, 1822. Shrub or small tree.

PARI-PINNATE. Even-pinnate; abruptly pinnate.

PARIS (from *par*, equal; alluding to the regularity of the parts). ORD. *Liliaceæ*. Of this genus, about half-a-dozen species have been proposed; but not more than three or four are sufficiently distinct for that rank. They are hardy perennial herbs, with creeping rhizomes, natives of Europe and temperate and mountainous Asia. Flowers green, erect, solitary, pedicellate; perianth persistent, with distinct segments in series of four to six. Leaves four or many, whorled at the apex of the stem, sessile or petiolate, lanceolate or ovate, slenderly three-nerved and reticulate-venulose. Stem simple. *P. polyphylla* and *P. quadrifolia* are the only species which call for description here. The leaves and stems of the latter were formerly employed in medicine, and the juice of the berry has been used to cure inflammation of the eyes. They thrive in light sandy loam, in a shaded situation. Propagated by divisons, or by seeds.

P. polyphylla (many-leaved). *fl.* pedicellate; sepals greenish, four to six, leafy, ovate-lanceolate; petals yellow, four to six, filiform; stamens four to ten. May. *fr.* brilliant scarlet. *l.* four to nine in a whorl, petiolate, linear or oblong-lanceolate, acuminate, rounded or acute at base. *h.* 3in. to 2½ft. Himalayas, 1826. (I. H. Pl. 24.)

P. quadrifolia (four-leaved). Herb-Paris; True Love. *fl.*, perianth yellowish-green, the four outer segments about 1in. long, the four inner ones rather more yellow; peduncle rising to 1in. or 2in. above the leaves. Spring or early summer. *fr.* bluish-black. *l.* four, broadly ovate or obovate, 2in. to 4in. long. Stem 9in. to 12in. high. Europe (Britain), Russian Asia, &c. "Sometimes, but rarely, there is a fifth leaf, with the addition of a fifth to each of the parts of the flower" (Bentham). (Sy. En. B. 1509.)

PARITIUM. Included under **Hibiscus** (which *see*).

PARK. An extensive inclosure of land, specially set apart for public or private recreation and enjoyment. In and around cities and large towns, public Parks, or similar open spaces, are essential for promoting health as well as for affording recreation. A private Park usually surrounds the owner's residence, and, in consequence, should be rendered as attractive as possible. Its beauty depends very materially on the natural landscape and disposition of land, although much may be accomplished, by way of improving Park scenery, by persons competent to conduct alterations. An irregular belt of trees, such as succeed best in the soil and locality, is always most satisfactory as a boundary, and all the material for forming the principal groups and masses in the Park should be similarly selected with a due regard to the description of soil. For instance, Chestnut, Elm, Oak, and Lime-trees are best suited with loam or clay soils; while Beech, Birch, and Sycamore may be cited as trees which succeed in poor soils and in exposed situations. Bold groups of trees, circular or oval in general outline, and composed of one species or variety, are to be recommended, and single specimens of a marked and distinct character may be judiciously introduced in well-chosen spots; not, however, with a too frequent repetition. In any system of arrangement, formality must be avoided; and the idea of producing a natural picturesque effect, where it is wanting, should be the aim kept in view. In planning and laying out Parks, and in improving Park scenery, much experience and judgment are necessary with each case individually. No two are exactly alike. The subject is one of an indefinite extent, and is far too vast for dealing with in such a limited space as that which is here available.

PARKERIA PTEROIDES. *See* **Ceratopteris thalictroides.**

PARKIA (named in honour of Mungo Park, 1771-1805, the celebrated African traveller). SYN. *Parypho-sphæra*. ORD. *Leguminosæ*. This genus comprises about eight species of showy, unarmed, stove trees, two or three of which inhabit tropical Asia and Africa, and four or five tropical America. Flowers very numerous, in large heads; upper ones yellowish, tawny, or red; lower ones sterile, white or red; peduncles sometimes solitary, axillary, very long, pendulous, sometimes several at the apices of the branches. Leaves bipinnate; leaflets small, numerous, and in pairs. The species best known in gardens are *P. africana* and *P. biglandulosa*. For culture, *see* **Inga.**

P. africana. African Locust, or Nitta-tree. *fl.* crimson, in bi-globular heads. February. *l.* with usually twenty pairs of pinnæ, each pinna bearing about thirty pairs of obtuse, pubescent leaflets, with a gland at the base of the petiole, and with a small, umbilicate gland between two or three of the upper pairs of leaflets. *h.* 30ft. to 40ft. Africa, 1822. An agreeable beverage is prepared from the sweet, farinaceous pulp surrounding the seeds, and sweetmeats are also made of it.

P. biglandulosa (biglandular). *fl.*, upper ones brownish-yellow or red, lower sterile ones whitish; calyx ¼in. long, the tube glabrous, the teeth pilose. Immature pod downy. *l.*, rachis downy, 1ft. or more long; pinnæ forty to sixty, 3in. to 4in. long; leaflets linear-ligulate, 150 to 200 to a pinna; petioles biglandular. Malay Peninsula.

PARKINSONIA (named after John Parkinson, 1567-1629, an apothecary of London, author of "Paradisis Terrestris," and "Theatrum Botanicum"). ORD. *Leguminosæ*. A genus comprising only three species of stove or greenhouse trees, of which one is Mexican, the second South African, and the third broadly dispersed over the warmer parts of Western America and the Antilles. Flowers disposed in short, loose, axillary racemes; calyx segments five, narrow, imbricate or sub-valvate; petals five, spreading. Pods linear, torulose. Leaves at first sight apparently simply pinnate and fasciculate, but really bipinnate; common petiole very short, spine-like; pinnæ two to four, very long; leaflets numerous, small; stipules often short, spinescent. *P. aculeata*, the only species in cultivation, is an ornamental, stove, evergreen plant, of great beauty, but very difficult to preserve. It is generally raised from imported seeds. The young plants should be potted in a well-drained, porous loam, and kept in a light, airy place.

P. aculeata (prickly). Jerusalem Thorn. *fl.* yellow, sweet-scented, disposed in loose, pendulous racemes. *l.* bipinnate; leaflets usually deciduous or abortive; petioles linear, very long, winged. *h.* 8ft. to 10ft. Tropical America, 1739; cultivated in all tropical countries. Plant furnished with generally solitary, straight prickles or spines. Stove.

PARMENTIERA (named after A. Parmentier, 1737-1813, a French writer on edible plants). ORD. *Bignoniaceæ*. A genus comprising about three species of glabrous, stove trees, inhabiting Mexico and Central America. Flowers greenish, large, at the nodes, solitary or few, pedicellate; corolla tube short above the base, incurved at the throat, ample, campanulate; limb sub-bilabiate. Fruit edible, elongate-fusiform or oblong. Leaves alternate or almost opposite, solitary or fasciculate at the nodes, trifoliolate, or in some cases simple; common petiole often winged. *P. cereifera*, the only species introduced, requires culture similar to **Bignonia** (which *see*).

P. cereifera (wax-bearing). Candle-tree. *fl.* white, large; lobes of corolla emarginate. *fr.* from 2ft. to 3ft. long, waxy-yellow, hanging down, and much resembling large candles; hence the common name. *l.* all trifoliolate; leaflets ovate-elliptic or obovate-oblong, acuminated at each end, serrated or entire; common petiole winged. Panama, 1866.

PARNASSIA (named from Mount Parnassus; called Grass of Parnassus by Dioscorides). Grass of Parnassus. ORD. *Saxifrageæ*. A genus comprising about twelve species of elegant, hardy, glabrous, erect, perennial herbs, often marsh-loving, inhabiting the temperate and frigid regions of the Northern hemisphere and the mountains of the whole of India. Flowers white or pale yellow, rather large; calyx tube short or very short,

Parnassia—*continued*

free or adnate at the base to the ovary; lobes five, spreading, imbricate; petals five, spreading, marcescent, entire or fimbriate; scape angular, one-flowered. Leaves radical, petiolate, ovate-reniform or oblong; petioles dilated at base. Parnassias succeed in a moist, peaty soil or spongy bog. Propagated by divisions, or by seeds.

P. asarifolia (Asarum-leaved). *fl.* white; petals five, abruptly contracted into a claw at the base. Summer. *l.*, radical ones kidney-shaped; cauline ones somewhat cordate-orbicular. *h.* 6in. North America, 1812. An extremely pretty plant, with larger leaves and flowers than the British species.

P. caroliniana (Carolinian). *fl.* white, netted with green or purple, and having a greenish tint; petals almost sessile. July. *l.*, radical ones somewhat orbicular, cauline ones ovate, sessile. *h.* 6in. North America (in swamps), 1802. (B. M. 1459; R. G. 824.)

P. fimbriata (fringed). *fl.* white; petals obovate, unguiculate, fringed at the base. July. *l.*, radical ones kidney-shaped, cucullate at the base; cauline ones cordate. *h.* 6in. North America. The leaves of this species are remarkably hollowed out at the base close to the lateral ribs, which are connected with one another by a common base, like the divisions of a pedate leaf, and have, consequently, a very elegant appearance.

P. nubicola (cloud-inhabiting). *fl.* white, solitary, 1in. to 1½in. in diameter; staminodes yellow, three-lobed; peduncle four-angled, 6in. to 12in. high. Summer. *l.*, radical ones petiolate, elliptic, sub-cordate; cauline ones solitary, sessile, elliptic. Himalayas, 1882. (B. M. 6609.)

P. palustris (marsh-loving). Common Grass of Parnassus. *fl.* white, marked with greenish, pellucid veins; petals almost sessile, somewhat emarginate. Summer. *l.*, radical ones cordate, cauline ones stem-clasping. *h.* 6in. Northern hemisphere (Britain). An elegant bog plant. (Sy. En. B. 565.)

P. parviflora (small-flowered). *fl.* white, with pale purple or green netted veins; petals sessile. July and August. *l.*, radical ones ovate, cauline ones sessile. *h.* 6in. North America, 1820.

PARNASSUS, GRASS OF. *See* **Parnassia palustris.**

PAROCHETUS (from *para*, near, and *ochetus*, a brook; referring to the habitat of the genus). ORD. *Leguminosæ*. A monotypic genus. The species is an elegant, hardy, prostrate, herbaceous plant; it is most desirable for the rock garden, and for choice borders in warm positions, and in light vegetable soil. Propagated by divisions, or by seeds.

P. communis (common). Shamrock Pea. *fl.* of a beautiful blue, rather large, having a slightly acute keel; disposed on solitary or axillary peduncles, or in umbels of two or three. *l.* digitately trifoliolate, and resembling those of the Shamrock; leaflets truncate, dentately-serrated. *h.* 2in. to 3in. 1820. Cold and temperate Himalayas, &c. (F. d. S. 1575.)

PARONYCHIA (old Greek name used by Dioscorides, and derived from *paronychia*, a whitlow, for which it was thought to be a cure). Nailwort; Whitlow Grass. ORD. *Illecebraceæ*. A genus of about forty species of small, annual or perennial, mostly hardy herbs, often cæspitose, natives of the Mediterranean region, North Africa, Arabia, America, and Angola. Flowers small, in cymose heads or fascicles, often hidden by the large, white, scarious bracts; perianth five-parted. Leaves opposite, oblong-lanceolate or subulate, flat, or very rarely with recurved margins, entire; stipules usually large, scarious, shining. Thé Arabe, or Algerian Tea (*Paronychia argentea*, Lam., and *P. nivea*, DC.), is used in catarrh, phthisis, and to promote digestion. Scarcely any of the species are worth growing, except, perhaps, the following. They thrive in a light, sandy soil. Propagated by seeds; the perennials also by divisions.

P. argentea (silvery). *fl.* whitish, axillary and terminal, crowded; bracts white and shining, acuminate. *l.* ovate, slightly glabrous, sub-acute; stipules broader, but shorter, than the leaves. South Europe, 1869. A free-growing and very dwarf plant, forming neat, compact patches 1ft. or more in diameter. The large, silvery stipules, and the numerous, scarious bracts of the same colour, have a good effect.

P. serpyllifolia (Thyme-leaved). *fl.* in dense heads at the tips of the shoots, surrounded and completely hidden by silvery, scarious bracts. Summer. *l.* sub-orbicular or obovate, ciliate. Stems prostrate. South Europe. This makes a pretty covering for beds, or amongst taller-growing plants, and is much used in carpet-bedding.

PARONYCHIEÆ. A tribe of *Illecebraceæ*.

PARROT-BEAK PLANT. *See* **Clianthus.**

PARROTIA (named after F. Parrot, 1792-1812, a German naturalist and traveller). ORD. *Hamamelideæ*. This genus comprises a couple of species of hardy trees or shrubs, the one inhabiting Kashmir, the other Northern Persia. Calyx-tube bell-shaped, and the border divided into five or seven lobes; corolla wanting; stamens five to seven; styles two. Leaves oblong or orbicular, deciduous, crenate; stipules large, deciduous. *P. persica*, under cultivation, is a beautiful, hardy shrub or small tree, whose chief attraction lies in the fine autumnal tints of its leaves. The most suitable situation for it is against a wall, where it will need no protection, and almost any soil will suit it. Both species may be propagated by seeds, or by layers.

P. Jacquemontiana (Jacquemont's). *fl.* small; calyx segments narrow, oblong or linear; involucral bracts obovate, ⅜in. long. *l.* 2in. to 3in. in diameter, blunt; petioles ¼in. long. *h.* 6ft. to 12ft. Kashmir. A gregarious bush, closely resembling a hazel. (B. F. F. 23.)

P. persica (Persian).* Iron-tree. *fl.* chiefly conspicuous for the numerous, spreading stamens. *l.* ovate-oblong, of a deep green in summer; in autumn, they assume at the tip a glowing crimson colour, in the centre a rich orange or yellow, while the base retains its green hue. *h.* 10ft. Persia, 1848. (B. M. 5744.)

PARROT'S BILL. *See* **Clianthus puniceus.**

PARRYA (named after Captain W. E. Parry, 1790-1855, the Arctic navigator). Including *Neuroloma* and *Pachyneurum*. ORD. *Cruciferæ*. A genus comprising half-a-score species of hardy, low, glabrous or pilose herbs, with thick perennial roots, all Arctic, or natives of the highest mountains of Northern Asia. Flowers white, rose, or purple, racemose, rarely on solitary scapes, usually showy; sepals erect; petals unguiculate, spathulate; scape naked or leafy. Pod compressed. Leaves linear or spathulate, entire or sinuate-toothed, in one species pinnatifid. Parryas thrive in any garden soil. Increased by division.

P. arabidiflorum (Arabis-flowered). *fl.* purple; petals obovate; pedicels scarcely longer than the calyx; scapes simple. May. *l.* sub-radical, somewhat fleshy, lanceolate. *h.* 6in. Siberia, 1800. SYNS. *Hesperis arabidiflora*, *Neuroloma arabidiflora*.

P. arctica (Arctic). *fl.* pale purple, borne in corymbs; anthers oval; peduncles quite smooth. May and June. *l.* almost all quite entire. *h.* 3in. Arctic America, 1820.

P. integerrima (entire-leaved). *fl.* beautiful purple, about the size of those of *Cardamine pratensis*; racemes at first corymbose. April and May. *l.*, radical ones rather spathulate, quite entire; cauline ones few. *h.* 6in. Siberia, 1827.

P. nudicaulis (naked-stemmed). *fl.* lilac, 1in. across, six to eight in a corymb on a leafless stem; petals obcordate. Early summer. *l.* all radical, petiolate, elliptic-oblong, acute, entire or toothed, 2in. to 3in. long. Arctic regions, 1883. A beautiful little rock-work plant.

PARSLEY (*Carum Petroselinum*). A hardy biennial, said to have been introduced into this country from Sardinia in 1548; it has become naturalised in some localities. Hooker, in the "Student's Flora," asserts that it is "only known as a cultivated plant or an escape," but De Candolle, in his "Origine des Plantes Cultivées," believes it to be truly wild in the Mediterranean region. The leaves are in great demand for garnishing, and also for flavouring in numerous culinary preparations. Parsley, for one or both of these purposes, is in daily request throughout the whole year, and the crop is, in consequence, a most important one, a continued supply being maintained only by devoting considerable attention and forethought to its culture. In some gardens, Parsley will, from some unaccountable cause, very rarely succeed; and in others, where it usually grows freely, it is not uncommon to find a sowing, or a whole crop, suddenly die away without, apparently, any satisfactory reason. This causes much inconvenience, and should be prevented, if possible, by sowing somewhat frequently, so that, in the event of a failure occurring, a supply from the succession may soon be forthcoming.

Parsley—*continued.*

Cultivation. A partially shaded position in the best part of the garden should be selected for Parsley. It is too often relegated to an unfavourable spot, or used as an edging to walks—situations in which it sometimes, yet but seldom, bears produce such as may be secured under more liberal treatment. A good soil, of considerable depth, and not too light, suits Parsley best. A thick coating of manure should be dug in previous to sowing, unless the soil is sufficiently rich without. Borders with a western or an eastern aspect may be utilised for the summer supplies, while that intended for winter should be sown in a sheltered position, with southern exposure, such, for instance, as the foot of a south wall. To maintain a continuous supply, it is advisable to sow at three different times: first, in February, as early as circumstances and the weather permit; secondly, in April or early in May; and thirdly, in July—this last being specially intended for winter. Sometimes the first spring sowing is sufficient, but it should not be solely depended upon where a large quantity is required. The seed should always be sown thinly in drills from 12in. to 15in. apart, and about 1in. deep. It is invariably a long time germinating; four or five weeks is not at all unusual. It is advantageous to fill in the drills with sandy soil at the first sowing, as this assists germination. Thinning of the young plants must be commenced when they are of sufficient size, allowing first a distance of 3in., and eventually about 6in. space for each. By this method, much larger leaves, of good substance, are obtained than when thinning is not practised, or only insufficient space is allowed between the rows. Should many of the leaves in summer become old, and turn yellow, in consequence of there being an unlimited supply, it is a good plan to cut over about half, or one-third, of the stock, and allow the crowns to grow afresh. Afterwards, the other part might be similarly treated if it were thought requisite. It is generally necessary to protect Parsley in winter, either by frames, hand-glasses, or other methods, as, although the plants are hardy, their leaves are not sufficiently so to withstand much frost; and these form the part in daily request. It is a good plan to prepare plants in a convenient part of a south border, with a view to placing spare or temporary frames and sashes over them before winter. Additional coverings of mats, or whatever may be available, are requisite in frosty weather. For small supplies, a few plants may be inserted thickly in pots or boxes, at intervals, and placed in any cool house or pit, or on a mild hotbed.

Transplanting Parsley may be recommended, particularly in unfavourable districts, and for the first spring-sown plants. For this purpose, the seeds should be sown thinly, in February, in a similar way to Carrots, &c., on a prepared hotbed, and the pit or frame should be ventilated, and otherwise treated in much the same manner. About the end of April, or early in May, the seedlings must be hardened off, and carefully transplanted about 6in. apart, in a warm border. The strong tap-root should be preserved, if possible, by gently handling the plants when removing them to their new quarters. If a supply has failed, some plants may be retained and made to produce leaves of a usable size much quicker by growing them on in frames or boxes, in a warm temperature, instead of placing all outside. Thus treated, a much earlier crop may be secured than if the seeds were sown outside in the usual way. Transplanting may also be practised, at the latter part of summer, for the winter crop, when it is intended to use frames for protecting plants in the ground in the manner already alluded to. From 6in. to 8in. each way would be sufficient space; such an even disposition of plants could scarcely be secured by another method.

If it is intended to raise seeds of the varieties of

Parsley—*continued.*

Curled Parsley, some established plants, having the most perfectly curled leaves, should be selected for that purpose, and transplanted in an open spot by themselves, in early spring. The seed ripens in quantity about July, and, after being dried, will retain its vegetative properties for from two to three years.

Sorts. Of the curled-leaved varieties of Parsley that are most valuable for ordinary use, and more especially for garnishing, those of a compact habit, and with close, perfectly curled leaves, are to be preferred. The common sort bears coarse leaves, but is of a somewhat hardier nature than those of which the leaves are curled; the latter are, however, far superior in every way. The following are amongst the best sorts in cultivation: COVENT GARDEN GARNISHING, beautifully curled leaves, of first-rate quality. FERN-LEAVED, a distinct variety, with close-crested leaves; fine for garnishing. MYATT'S GARNISHING, strong-growing, beautifully curled; an excellent sort, very extensively cultivated. VEITCH'S SPLENDID CURLED, a very excellent and select stock, with beautifully curled leaves.

Hamburgh, or Turnip-rooted, Parsley is a variety grown only for the use of its fleshy roots, which are cooked and eaten like Parsnips. Seeds may be sown in February or March, in drills, 1ft. apart. The plants should, in due course, be thinned, and lifted when full grown, about October, when they may be stored in sand until required for use.

Neapolitan, or Celery-leaved, Parsley may here be referred to, as it is sometimes grown for the use of the leaf-stalks, which are blanched and eaten like those of Celery. The seeds should be sown in March, the seedlings being afterwards transplanted into shallow trenches, 2ft. apart, and treated like Celery, except that they must not be so freely watered.

PARSLEY FERN. *See* **Cryptogramme.**

PARSLEY FERN, MOUNTAIN. *See* **Cryptogramme.**

PARSNIP (*Peucedanum sativum*). A hardy biennial, a native of Europe (Britain) and Siberia. It has been cultivated since the time of the Romans for its roots, which are eaten as a vegetable, and used for various purposes, not the least being that of the preparation of an excellent wine. Parsnips are very nutritious, but not so much so as Potatoes, a vegetable for which they have been recommended as a substitute. Potatoes are also more productive, and their flavour far more generally liked, than Parsnips; still, the latter are much esteemed, and form a portion of the crops in almost every kitchen and also cottage garden, whether large or small. In the Channel Islands, this vegetable is successfully cultivated, the soil there being peculiarly adapted to its requirements. The roots are in greater request, at certain seasons, in Roman Catholic countries than in others.

Cultivation. Parsnips succeed best in an open situation, where the soil is not too stiff, yet is rich, and of a good depth. A somewhat sandy loam is most suitable, and it is best if tolerably free from stones, which tend to divert the roots from a straight downward course. Land in preparation, and intended for the vegetable under notice, should be deeply trenched the previous autumn, and manure added then, if necessary—its addition in spring invariably results in the production of forked, instead of straight, roots. Ridges of soil left for the winter should be levelled down in February, or very early in March, and the seed sown thinly, yet regularly, in shallow drills, 18in. or 20in. apart. Before the young plants become drawn, they should be thinned, partially at first, and finally, in due course, to distances of 12in. or 15in. apart, according to the size they are likely to attain. An occasional hoeing will be all that is necessary until the leaves die in autumn, when the roots will

Parsnip—*continued.*

be fit for use, and a stock may be lifted and stored in a cool shed, for that purpose being covered with sand or light soil. Parsnips are, however, much better if dug from the ground as required for use; consequently, only enough should be stored inside for maintaining a supply in frosty weather up till February, or until growth recommences, when the whole stock must be dug up. A Parsnip, with a portion of its leaves removed, is represented in Fig. 33.

FIG. 33. PARSNIP.

Seed Saving. Parsnip seed does not satisfactorily retain its germinative powers longer than one year. If seed is to be raised, a few of the best roots should be carefully planted in a sheltered position early in the year. The seed will ripen in quantity during the latter part of summer, when it may be dried and stored in the ordinary way.

Sorts. These are not numerous. The following are the best: HOLLOW-CROWNED, large, heavy, and of excellent quality; best for general use. LARGE GUERNSEY, roots large, long, and tapering; a variety extensively cultivated in the Channel Islands. THE STUDENT, medium size, of superior flavour and good quality.

There is a variety called Turnip-rooted, because of its roots resembling Turnips in shape and growing principally above ground. It is not much cultivated, but has been recommended for shallow soils, on which the other sorts do not properly succeed.

Pests. The Parsnip is occasionally liable to the attacks of Fungi, of which, probably, the worst are *Erisyphe Martii* and *Peronospora nivea*; but the crop seldom suffers much from these causes. Means of prevention and of remedy will be found under the headings **Mildew, Oidium,** and **Peronospora** (which *see*).

Parsnip—*continued.*

The insects that most frequently injure Parsnips also affect various allied plants, notably the Carrot, and they will be found mentioned under the following headings: **Carrot Blossom Moth** (*Depressaria daucella* or *D. nervosa*), **Carrot Grubs** (*Psila Rosæ*), **Celery Fly** (*Tephritis Onopordinis*), **Flat-body Moth** (*Depressaria applana* or *D. cicutella*), **Parsnip-Seed Moth** (*D. Heracleana*), and **Purple Carrot-Seed Moth** (*D. depressella*). Their appearance, habits, and modes of doing damage, and the best remedies against each, will be found in detail under these heads, but may be summarised here as follows:

Psila Rosæ is a small, two-winged fly, the grubs of which are slender, white or yellowish, and about ¼in. long. They burrow into the tap-roots of Parsnips and of Carrots, forming narrow, irregular galleries. The diseased plants show the injury by the outer leaves drooping and turning yellow. It has been found useful, as a remedy, to water the plants with solutions of paraffin (one ounce to one gallon of water) or of alum, or liquid manure; and gas-lime, soot, or sand prepared with tar (one gallon to a barrowful of sand), are all useful applications if dug into the soil.

Tephritis Onopordinis is harmful, inasmuch as the grubs burrow between the surfaces of the leaves of Parsnips, producing large, pale patches, in which the surfaces are separated from each other. These patches are useless for the nutrition of the plant; hence, when numerous, much injury is done to the leaves. One or more grubs are present in each patch. When full-fed, they generally bore through the skin of the leaf, and into the soil, and in it they turn into brown, oval pupæ; but sometimes they become pupæ in the discoloured patches of the leaves. From the pupæ, in a fortnight or so in summer, or after the winter, emerge brown or yellowish two-winged flies, about the size of house flies, with brown-spotted wings and green eyes. The best remedy is to crush the spots, when they are small, between the finger and thumb, or pick off and burn the diseased leaves. The leaves may also be sprinkled with lime, or gas-lime, or soot, to prevent deposition of the eggs. The pupæ may be destroyed by digging gas-lime into the soil in autumn and winter, or by paring off and burning 3in. or 4in. of the surface soil.

All the moths that need be noticed here belong to the genus *Depressaria*, a rather large group of insects, included in the **Tineina** (which *see* for characters). They vary from a little over ½in. to 1in. across the wings. The fore wings are cut square at the tips, and the hind margin of the hind wings is generally notched near the base. The insects are usually grey, reddish-brown, or brown, and the fore wings bear darker spots or streaks. Several of these moths live on umbelliferous plants, in the umbels of flowers, or in pieces of the leaves so rolled as to form tubes. The parts occupied by them are spun together by means of silk, and thus afford them protection from enemies of every kind. When the web is torn, or even if the plant is shaken, the larvæ wriggle to the exterior, and drop to the ground, to re-ascend at leisure. When full-fed, they usually bore into stems of the food-plant, and in them become pupæ. In this state they frequently hibernate, though some live through the winter as moths. Those larvæ that feed on the leaves do comparatively little harm, but those that feed in the umbel eat the flowers and fruits, and do much mischief to the seed crop. The best remedy is hand-picking, or shaking the affected umbels. The larvæ readily fall out, and should be trampled upon and crushed before they can crawl away, or again reach the umbels.

PARSNIP FLY. *See* **Tephritis Onopordinis,** under PARSNIP PESTS.

PARSNIP-SEED MOTH (*Depressaria Heracleana*). A small moth, belonging to a genus which includes about forty British species. It is one of the large group *Tineina*, a group characterised chiefly by the long fringes of the wings, which are, in most of them, long and narrow, and by the slender body. The moth has a spread of wings of about 1in., and has the fore wings rather broad and greyish-ochreous, with numerous, short, fuscous streaks, and two or three darker spots, surrounded with whitish scales. The hind wings are grey, and are notched on the hind margin near the base. The larva is dull grey above, dull yellow along the sides; the head, second segment, and spots on the body, are black. It feeds usually on Hogweed (*Heracleum sphondylium*), but also eats Parsnips. It generally lives in the umbels, drawing them together by a web. In this it lies protected, but emerges and drops as soon as the plant is shaken. The larvæ may become hurtful by feeding on the seeds. If necessary, they may be diminished by shaking over anything from which they can be swept up and destroyed; or they may be shaken on to the soil, where they can be trodden on and crushed. The pupæ may be found, occasionally in numbers, in the interior of the Parsnip stems; and they may be collected and destroyed, with the latter, without difficulty. It would be well to clear away all umbelliferous weeds, on which these insects feed.

PARSONSIA (named in honour of Dr. John Parsons, 1705-1770, a Scotch physician and writer on natural history). SYNS. *Heligma*, *Helygia*, and *Spirostemon*. ORD. *Apocynaceæ*. A genus comprising twelve species of greenhouse, glabrous or puberulous, twining shrubs or sub-shrubs, natives of tropical Asia, Australia, and New Zealand. Flowers whitish, small; cymes dichotomous, terminal or shortly pedunculate in the axils, sometimes forming a terminal thyrse. Leaves opposite. For culture, *see* **Dipladenia.**

P. albiflora (white-flowered). *fl.* white, ¼in. long, in many-flowered panicles, odorous; corolla-lobes shorter than the tube. May. *l.* usually 1in. to 2in. long, coriaceous, oblong-ovate or lanceolate, with transverse veins, more rarely linear or obovate, or narrow linear-lanceolate, 3in. to 4in. long, with lobed margins, in young plants spathulate. Stems stout, glabrous or pubescent. New Zealand. SYN. *P. heterophylla* (J. H. S. v. 195). *P. variabilis*, of Lindley, is supposed, by some authorities, to be founded on young specimens of this.

P. heterophylla (variable-leaved). A synonym of *P. albiflora*.

P. velutina (velvety). *fl.*, corolla tube shorter than the calyx; cymes rather small and dense, solitary or few, on opposite, axillary peduncles. July. *l.* on rather long petioles, from broadly-ovate to ovate-oblong, truncate or cordate at base, 2in. to 5in. long. Australia. A tall, woody climber, softly pubescent or villous.

PARTERRE. A French term, used, in this country, to denote a small inclosure or flower-garden, laid out in beds of different sizes and shapes.

PARTHENIUM (an ancient Greek name used by Hippocrates for an allied plant, from *parthenos*, virgin). SYNS. *Argyrochæta*, *Villanova*. ORD. *Compositæ*. A genus comprising about half-a-dozen species of erect herbs, sub-shrubs, or shrubs, natives of North and Central America, and the West Indies. Flower-heads white or yellowish, heterogamous, small, disposed in terminal, sometimes densely corymbose, sometimes loose panicles; achenes glabrous or slightly pilose; involucre broadly campanulate or hemispherical; receptacle small, convex or conical. Leaves alternate, entire, toothed, or pinnately dissected, often scabrous above, more or less canotomentose or slightly glabrous below. *P. Hysterophorus*, the only species calling for mention in this work, is a plant of no particular beauty. It thrives in any common soil. Increased by seeds, sown in bottom heat, in spring; the seedlings should be afterwards hardened off, and transplanted in a warm, sunny spot.

P. Hysterophorus (Hysterophorus). Bastard Feverfew; West Indian Mugwort. *fl.-heads* whitish, disposed in spreading panicles; pappus scales oblong, blunt; involucral scales acute. *l.* twice pinnatipartite, the uppermost ones entire. A tall, greenhouse or half-hardy, hispidulous annual. (B. M. 2275.)

Parthenium—*continued.*

PARTIAL. Secondary; *e.g.*, Partial involucre.

PARTITE. Divided into a number of segments, which extend almost as far as the base of the part to which they belong; *e.g.*, Tripartite, three-parted; Quadripartite, four-parted, &c.

PARTITION. A term applied, botanically, to the deepest divisions into which a leaf can be cut without becoming compound.

PARTRIDGE BERRY. A common name applied to *Gaultheria procumbens* and *Mitchella repens*.

PARTRIDGE PEA. *See* **Heisteria.**

PARYPHOSPHÆRA. A synonym of **Parkia** (which *see*).

PASCALIA (named after Dr. D. Pascal, a professor at Parma). ORD. *Compositæ*. A monotypic genus, the species being an erect, half-hardy, perennial herb, allied to *Rudbeckia*, and having a resinous smell. It should be grown in a dry, warm spot, and needs the protection of a frame in winter. Propagated by divisions, in spring; or by cuttings, inserted under a handlight, in summer. "The plant cultivated in England as *P. glauca* is evidently a species of Sunflower, and has nothing to do with this genus" (Lindley and Moore).

P. glauca (milky-green). *fl.-heads* yellow, nearly 1in. across, terminating each branch, solitary; receptacle chaffy. July. *l.* trinerved, glaucous. *h.* 1½ft. Extra-tropical South America, 1799. (A. B. R. 549.)

PASPALUM (from *Paspalos*, one of the Greek names for Millet). Millet Grass. ORD. *Gramineæ*. A large genus (nearly 160 species) of stove, greenhouse, or hardy grasses, mostly American, a few broadly distributed, two natives of South Europe. Spikes on elongated peduncles, sometimes solitary or twin, sometimes wavy and subdigitate at the apex, or scattered at the sides of the peduncles; spikelets usually biseriate. The species have no horticultural value.

PASQUE FLOWER. *See* **Anemone Pulsatilla.**

PASSIFLORA (from *passio*, passion, and *flos*, *floris*, a flower; a name given by the early missionaries in South America, in allusion to a fancied representation in the blossoms to the implements of the Crucifixion). Passion Flower. Including *Disemma* and *Murucuja*. ORD. *Passifloreæ*. A genus comprising about 120 species of stove, greenhouse, or hardy, climbing, or rarely erect, herbs or shrubs; they are mostly American, but a few are found in Asia and Australia. Flowers hermaphrodite, very rarely unisexual, often showy, axillary, solitary, or racemose; calyx tube short, urceolate, the lobes four or five, linear-oblong or linear, often coloured on the inside; petals four or five, or none, almost equal to the calyx lobes and more-coloured; corona simple or duplex, the exterior of many, one or two-seriate filaments, or membranous and tubular, the interior tubular or absent; gynophore elongated, girded at the base by a thick pitcher; stamens four or five, adnate to the filaments of the gynophore, free at the tips; anthers linear-oblong, versatile. Fruits ovoid or globose, juicy or pulpy, sometimes almost three-valved, many-seeded, in a few species edible. Leaves alternate, rarely opposite, entire, lobed, or parted; petioles often glandulose; tendrils lateral, undivided, rarely absent; stipules two or none, sometimes leafy. One or more of the species of *Passiflora* should always be included amongst plants selected for covering the roof or rafters of either a stove or greenhouse. They are best adapted for large structures; in small houses, close pruning becomes necessary, and the plants, consequently, cannot properly

Passiflora—*continued.*

develop their true characters. The flowers are very beautiful in some species; in all, they are of singular form and extremely interesting.

Propagation is readily effected from cuttings of young shoots, about 6in. long, taken in spring with a heel, and inserted singly in small pots of sandy soil. They should be placed in a close propagating frame, or under a bell glass, where they will root in due course pretty freely. Once rooted, and gradually inured to the open house, the plants grow rapidly, and when repotting rather large shifts may be safely allowed. They may eventually be permanently planted out, and the growth trained over the roof or rafters, or cultivated for a similar purpose in large pots or tubs. Passifloras usually grow freely, and are not over-fastidious regarding soil, provided there is good drainage, and plenty of water is given throughout the growing season. If planted in borders, the roots should be partially restricted, and a depth of soil not exceeding a foot will be sufficient.

FIG. 34. PORTION OF FLOWER-BEARING BRANCH OF PASSIFLORA CÆRULEA.

This should be composed of turfy loam with a small portion of peat and some sharp sand intermixed. Very rich soils are apt to cause an over-luxuriant growth at the expense of the floriferous habit which the plants usually assume. Attention should be devoted to training the shoots and preventing overcrowding by cutting the weakest away, allowing the terminal points of others to hang gracefully. When flowering is over, the main growth may be regulated, thinned, if necessary, and cut in. Both stove and greenhouse species thrive under very similar treatment, except that the latter do not require so much heat as the former, and do not generally grow quite so rapidly. *P. cærulea* succeeds in favourable localities outside. If trained to a south wall, it grows rapidly, and soon covers a large surface. The numerous orange-coloured fruits that ripen towards autumn are as ornamental as the flowers which precede them.

Except where indicated otherwise, the undermentioned species are climbers, and require stove treatment.

Passiflora—*continued.*

P. Actinia (Sea-anemone-like). *fl.*, petals nearly white, oblong, rather longer than the calyx; calyx with a short tube, and a limb of five greenish, oblong lobes; crown of numerous spreading, worm-like filaments, deeply banded with red, blue, and white, inclosing three circles of very minute processes; peduncles axillary, single-flowered. November and February. *l.* about 3in. long, ovate, obtuse, emarginate, the petioles scarcely half as long. Organ Mountains, 1842. (B. M. 4009.)

P. adiantifolia (Adiantum-leaved). A form of *P. Banksii*.

P. alata (winged-stemmed).* *fl.* very sweet-scented; upper side of calyx and petals deep crimson; rays variegated with purple, white, and crimson; pedicels terete; bracts slightly toothed. April to August. *l.* glabrous, somewhat cordate, ovate, acute; petioles bearing four glands; stipules lanceolately-falcate, somewhat serrated. Branches tetragonally winged. Peru, 1772. (B. M. 66; L. B. C. 246.) *P. Buonapartea* is probably a hybrid between this species and *P. quadrangularis*.

P. a. brasiliana (Brazilian). *fl.* solitary, axillary; sepals oblong, very convex, coloured at the edges, each bearing below the end a little bristle; petals longer, but similar, within deep scarlet, outwardly deep violet, with a white streak along the middle; crown about as long as the petals, composed of several rows of tapering processes, which are collected into a cylinder, and are white, with crimson bands on the lower half, deep rich violet on the upper half. September. *l.* about 6in. long, oblong, abruptly pointed; petiole over 1½in. long, with two yellow, conical glands at the upper end; stipules narrow. 1831. SYN. *P. phœnicea* (B. R. 1603).

P. alato-cærulea (winged-blue). *fl.*, petals white inside; calyx lobes rose-coloured on the outside; crown triple; outer filamentous appendages variegated with black, blue, and white; pedicels terete, much longer than the petioles. June to October. *l.* glabrous, cordate, three-lobed; lobes quite entire, ovate-lanceolate; petioles bearing two to four glands. 1823. A garden hybrid between *P. alata* and *P. cærulea*. (B. R. 848.)

P. alba (white).* *fl.* white; superior peduncles longer than the leaves. May. *l.* glabrous, glaucescent beneath, somewhat cordate at base, five-nerved, trilobed; lobes oval, somewhat glandularly serrated at base; petioles biglandular in the middle. Brazil, 1830. SYN. *P. atomaria*. (G. C. n. s. xix., p. 693; R. H. 1883, Fig. 39.)

P. albida (whitish). A synonym of *P. mucronata*.

P. albo-nigra (white and black). *fl.*, petals white; corona blackish-purple below, white above. Summer. *l.* palmately five-lobed. This is said to be a cross between *P. alata* and *P. Raddiana*. (R. G. 1852, 8.)

P. amabilis (lovely).* *fl.*, sepals and petals red within, conformed; filaments of the corona almost quadriseriate, white, shorter than the perianth; peduncles solitary, one-flowered.

Passiflora—*continued.*

May. *l.* membranous, ovate, acute, entire; stipules ovate, acuminate, entire, shorter than the glandulose petioles. Stem slender, terete. South America, 1848. (B. M. 4406.)

P. amethystina (amethystine). *fl.* purplish; margins of corona inflexed; ovary tomentose; peduncles as long as the leaves; bracts absent. November. *l.* trilobed, cordate, glabrous; lobes oblong, obtuse, almost equal, obscurely serrulate; petioles bearing two or three glands. Brazil, 1827. (B. R. 1838, 21, under name of *P. onychina*.)

P. arborea (tree-like). *fl.* 2in. to 3in. broad; perianth tube 1½in. to 2in. long, terete, green; sepals and petals similar and equal, greenish-white inside; corona triple; the outer of yellow filaments nearly two-thirds as long as the petals; the middle a ring of short filaments round the mouth of the tube; inner of fimbriate scales, pressing against the column; peduncles pendulous, three to six-flowered; bracts none. July. *l.* drooping, 6in. to 2½ft. long, oblong, elliptic, or obovate; petioles stout, cylindric, 1in. to 1½in. long. Stem slender, erect, terete, 1ft. to 14ft. high, sparingly branched; branches horizontal or drooping. New Grenada, &c., 1807. An interesting species, from its erect habit and peculiar appearance. SYN. *P. glauca* (of Humboldt). (B. M. 5864.)

P. atomaria (dotted). A synonym of *P. alba.*

P. atropurpurea (dark purple). *fl.* 3in. in diameter; tube short, white inside; sepals reddish-violet; petals crimson; coronal threads violet, spotted with white. 1883. Garden hybrid. Greenhouse.

P. aurantia (orange). A synonym of *P. Banksii.*

P. Banksii (Banks'). *fl.* sometimes pale on first opening, but soon becoming brick-red or dull scarlet, on pedicels much shorter than the leaves; calyx lobes 1½in. or more long; petals scarcely ¾in. long, narrow; inner corona broadly tubular, plicated, and shortly lobed at the orifice; outer one of a single row of filaments. July. *l.* broad, usually under 3in. long, with three broad, obtuse lobes, rarely divided to the middle of the leaf, each lobe sometimes two or three-lobed. Australia. Greenhouse. SYNS. *P. aurantia* (A. B. R. 295), *Disemma aurantia* (B. M. 4140). *P. adiantifolia* (B. R. 233; L. C. B. 36, under name of *Murucuja Bauerî*) is a mere form of this species.

P. Belottii (Belotti's). *fl.* large and showy; sepals flesh-coloured, tinged with green; petals delicate light rose-colour; rays of the corona blue, with indistinct transverse purple bars. Summer. *l.* large, glabrous, alternate, deeply three-lobed; lobes acuminate, entire. Stems round, tendrilled. 1847. A robust hybrid between *P. cæruleo-racemosa* and *P. quadrangularis.* (G. M. B. i. 9.)

P. bifiora (two-flowered). A synonym of *P. lunata.*

P. cærulea (blue-flowered).* *fl.* faintly scented, lasting but one day; calycine segments pale greenish-white, the petals of nearly the same shape and size; styles purplish; rays of the corona in two circles, purple at the bottom, white in the middle, and blue at the ends; bracts ovate, entire. June to October. *fr.* egg-shaped, yellow when ripe. *l.* glabrous, five-parted; lobes oblong, quite entire; petioles bearing four glands at the apex; stipules falcate. Brazil and Peru, 1699. Hardy. See Fig. 34. (B. M. 28.) *P. chinensis* (of gardens) and *P. Mayana* are probably forms of this species. *P. Hartwiesiana* is probably a seedling variety with white flowers. CONSTANCE ELLIOTT is a fine seedling form with white-scented flowers, raised by Lucombe and Pince, Exeter.

P. c. Colvillei (Colville's). *fl.* whitish; petals tinged with blue; outer corona variegated with purple, white and blue. *l.* with oblong-lanceolate, serrulated lobes; petioles biglandular at apex. Said to be a hybrid between *P. cærulea* and *P. incarnata.* (S. B. F. G. 125.)

P. cæruleo-kermesina (blue and carmine). This is probably a hybrid between *P. cærulea* and *P. Raddiana.*

P. cæruleo-racemosa (blue-racemose).* *fl.* purple; pedicels axillary, solitary, one-flowered. June to October. *l.* quite glabrous, rather coriaceous, three to five-lobed; lobes undulated, somewhat toothed at the base; petioles bearing four glands. A hybrid between *P. cærulea* and *P. racemosa.* Greenhouse or nearly hardy. (L. B. C. 573.)

P. capsularis (capsular). *fl.* yellow and green; pedicels solitary, ovary elliptic-oblong, and, as well as the fruit, acutely hexagonal, glabrous. June and July. *fr.* purple when ripe, small. *l.* downy, cordate at base, two-lobed, with an awn in the recess between the lobes, and, as well as the petioles, glandless. Tropical America, &c., 1820. (B. M. 2868.)

P. c. acutiloba (acutely-lobed). *l.* deeply two-lobed, hardly pubescent above, painted with white.

P. c. geminiflora (twin-flowered). *fl.*, pedicels twin. *l.* glabrous, hardly cordate at base. Branches triangular.

P. cincinnata (curled).* *fl.* pale violet-purple, bold, showy, axillary; corona of long and singularly curled and twisted, dark violet ciliæ, marked with alternate bands of white and purple near the base. August. *l.* deeply digitately lobed, glossy dark green. Stems glabrous. Brazil, 1868. Greenhouse. (B. M. 5737; G. C. 1868, p. 966.)

P. cinnabarina (cinnabar-red).* *fl.* scarlet, axillary, solitary, widely spreading, 2½in. in diameter; outer corona of a single series of erect filaments; inner shorter, membranous, deeply plicate.

Passiflora—*continued.*

March. *l.* usually deeply trifid, occasionally five-lobed, subcordate or distinctly cordate at the base, with a wide sinus; lobes ovate or ovate-elliptical, entire, or the medium lobe with a broad, obtuse, lateral tooth on each side. Australia. (B. M. 5911.)

P. coccinea (scarlet-flowered).* *fl.* scarlet, with orange-coloured rays; bracts ovate, sub-serrated, velvety. June to November. *fr.* full of sweet, juicy, edible pulp. *l.* glabrous, ovate, coarsely toothed, slightly acute; petioles bearing four to six glands. British Guiana, Brazil, and Peru, 1820. (B. H. xvi., xiii., under name of *P. fulgens.*)

P. cuprea (coppery). *fl.* orange-coloured, with a purple calyx; petals oblong-linear, shortly exceeded by the calyx; coronal leaflets linear, blunt; pedicels single, much exceeding the petiole, the uppermost racemose. July. *l.* roundish-oval, entire, mucronulate, shortly petioled, reticulated on both sides. Bahamas, 1724.

P. Decaisneana (Decaisne's). *fl.* about 4in. in diameter; sepals and petals brilliant carmine on the inside; rays of the corona barred with purplish and white below, deep bluish-purple and white towards the tips. Summer. *l.* about 3in. long; petioles stout, bearing three pairs of glands; stipules elliptic. A hybrid between *P. alata* and *P. quadrangularis.* (F. d. S. viii. 848.)

P. discolor (discoloured). A synonym of *P. Maximiliana.*

FIG. 35. FRUIT AND LEAVES OF PASSIFLORA EDULIS.

P. edulis (edible).* *fl.* white, tinged with purple, ragrant; corona about equal in length to the calyx lobes; ovary glabrous; bracts glandularly serrated. July and August. *fr.* livid-purple when ripe, elliptic, 1½in. in diameter, edible; pulp orange-coloured, with an acid taste resembling the flavour of an orange. *l.* glabrous, trilobed, serrated; petioles biglandular at the apex. Brazil. The fruit of this species is produced in abundance. See Fig. 35. (B. M. 1989; B. R. 152, under name of *P. incarnata var.*)

P. e. verrucifera (warted). *fl.* very curious and pretty; sepals white within, twice as broad as the white petals; coronal rays dark purple, two-seriate, equal, shorter than the petals; bracts and sepals warted. April. *l.* glabrous, three-lobed, serrated,

Passiflora—*continued.*

obtuse or cuneate at base; petioles biglandular at the apex, twice as long as the peduncles; stipules setaceous, almost equalling the peduncles. Brazil, 1837. Greenhouse. (B. R. 1840, 52, under name of *P. verrucifera.*)

P. filamentosa (filamentous). *fl.* with whitish petals and blue corona coloured similarly to those of *P. cærulea*; corona longer than, or nearly equalling, the calyx; bracts serrated. July to October. *l.* glabrous, five-parted, serrated; petioles biglandular in the middle. South America, 1817. (B. M. 2023; B. R. 584.) SYN. *P. palmata* (L. B. C. 97).

P. fœtida (stinking). Wild Water Lemon. *fl.* whitish, the corona variegated with purple and blue. May to October. *l.* villous on both surfaces, five-nerved, cordate at base, three-lobed; lobes nearly entire, lateral ones very short, middle one acuminated; petioles, as well as the stems, hispid. Tropical America, &c., 1731. Annual, or rarely perennial. SYNS. *P. hircina* (of gardens), *P. hirsuta.* (L. B. C. 138.)

P. f. ciliata (ciliate-leaved). *fl.*, petals greenish on the outside, red within; rays of corona variegated with white and purple; stipes of ovary deep purple, with darker spots. July to September. *l.* glabrous, somewhat five-nerved, cordate at base, trifid; lobes acuminated, ciliated. Jamaica, 1783. (B. M. 288.)

P. f. nigelliflora (Nigella-flowered). *fl.*, segments five, pale green without, white within, oblong; petals white, the same shape; filaments of nectary white, bluish at the tip, inclosing a double circular disk; involucre of three pinnatifid leaves. September. *l.* cordate, five-lobed, hairy, or almost silky on both sides, emitting a fœtid odour when bruised. Stem and petioles hairy. Mexico, 1835. (B. M. 3635, under name of *P. nigelliflora.*)

P. fulgens (shining). A synonym of *P. coccinea.*

P. glauca (glaucous), of Aiton. A synonym of *P. stipulata.*

P. glauca (glaucous), of Humboldt. A synonym of *P. arborea.*

P. gracilis (slender). *fl.* whitish; rays of corona blue and white; peduncles axillary, solitary. August. *fr.* egg-shaped. *l.* subcordate, glabrous, three-lobed; lobes roundish, beset with two to four glands; petioles bearing two glands. 1823. (B. R. 870.)

P. Hahnii (Hahn's).* *fl.* white, 3in. across, with a double yellow corona. Summer. *l.* peltate, oval, bright green above, reddish on the under surface. Mexico, 1870. Greenhouse. (G. C. n. s., x. 305, xii. 504; R. H. 1869, 430, under name of *Disemma Hahnii.*)

P. Herbertiana (Lady Carnarvon's). *fl.* solitary or in pairs, rather large, on pedicels shorter than the leaves; calyx lobes greenish-white or pale orange-yellow, nearly 1½in. long; petals narrow, scarcely ⅔in. long; inner corona about ½in. long, crenate or shortly lobed; outer one rather shorter, of a single row of filaments. July to September. *l.* broad, truncate or slightly cordate at base, with three triangular, almost acute, lobes, pubescent on both sides; petioles biglandular. Australia, 1821. SYN. *Disemma Herbertiana.* (B. R. 737.)

P. hircina (goat-scented). A garden synonym of *P. fœtida.*

P. hirsuta (hairy). A synonym of *P. fœtida.*

P. holosericea (wholly-silky). *fl.* white, spotted with red; rays of corona variegated with purple and white. May to August. *l.* ovate, somewhat trilobed, aristately toothed at the base; petioles biglandular. Vera Cruz, 1733. Plant clothed with soft, velvety down. (B. M. 2015; B. R. 59.)

P. Hullietti (Hullett's). A garden synonym of *P. macrocarpa.*

P. Imperatrice Eugénie (Empress Eugénie's). *fl.* about 4in. across; petals white, tinged on the inside with reddish-lilac; rays of the corona white, with regular transverse bars of blue, which become reddish-purple towards the base. Summer. *l.* deeply three-lobed, the lobes slightly mucronate. 1858. Apparently a cross between *P. cærulea* and *P. quadrangularis* or *P. alata.* (I. H. 1858, 175.)

P. incarnata (flesh-coloured).* May Apple. *fl.* sweet-scented; petals white; corona having a double circle of purple rays; bracts glandularly serrated; ovary villous; calyx lobes pale green. July and August. *fr.* orange-coloured, about the size of an apple, with a sweetish, yellow pulp. *l.* glabrous, somewhat cuneate at base, five-nerved, deeply trifid; lobes lanceolate, serrated; petioles biglandular at apex. Southern United States, 1629. A greenhouse perennial, sending up annually a number of herbaceous shoots. (B. M. 3697.)

P. Innesii (Innes').* *fl.* very handsome; sepals white internally; petals whitish, thickly speckled with red; corona in many rows, white, banded with red at the base, violet-spotted above the middle, and white at the apex. 1870. A fine garden hybrid between *P. alata* and *P. macrocarpa.*

P. insignis (remarkable). A synonym of *Tacsonia insignis.*

P. jorullensis (Jorullo). *fl.* orange, twin, small; calyx segments five, expanded; corolla connate with the calyx, five-fid, the laciniæ revolute-deflexed, much shorter than the calyx; corona double; peduncles above 1in. long, articulated at apex. June. *l.* bilobed; lobes reniform, obtuse, mucronulate, broadly rotundate, purplish-glaucescent beneath; stipules linear, small. Central America, 1852. SYN. *P. Medusæa.* (B. M. 4752; F. d. S. v. 528; L. & P. F. G. i., f. 59.)

P. kermesina (carmine). A synonym of *P. Raddiana.*

P. laurifolia (Laurel-leaved). Jamaica Honeysuckle; Water Lemon. *fl.* red and violet, sweet-scented; bracts obovate, glandularly serrate at the apex. June and July. *fr.* yellow, with white spots, the size of a hen's egg, but rather more elongated, containing a whitish, watery, edible pulp. *l.* glabrous, ovate-oblong, entire; petioles biglandular at the apex; stipules setaceous, the length of the petioles. West Indies and South America, 1690. (B. R. 13.) SYN. *P. tiniifolia* (B. M. 4958).

P. Lawsoniana (Lawson's). *fl.* 3in. to 4in. across; calyx lobes reddish-brown in the interior; petals reddish, oblong-obtuse, shorter than the sepals; corona in many rows, the outer filamentous. Summer. *l.* sub-peltate, rather thick, ovate-oblong, slightly cordate, acuminate, entire. 1868. A hybrid between *P. alata* and *P. racemosa.*

P. ligularis (strap-shape-stipuled). *fl.* green and purple, particoloured; bracts ovate, entire. September. *l.* glabrous, cordate, acuminate, entire; petioles bearing four to six cylindrical glands; stipules ovate-lanceolate, acuminated. Peru, 1819. (B. M. 2967.) SYN. *P. Lowei* (R. G. 1852, 9).

P. Lowei (Lowe's). A synonym of *P. ligularis.*

P. lunata (lunate). *fl.* white, the rays of the corona yellow; pedicels twin, jointed above the middle; calyx exceeding the corolla. June to August. *l.* glabrous, glandular beneath, cordate at base, three-nerved, truncate, somewhat bi- or trilobed; petioles short, glandless. West Indies and South America, 1800. (B. M. 2354; B. R. 577.) SYN. *P. biflora.*

P. lutea (yellow). *fl.* pale yellow, on twin pedicels; filaments of the corona in three rows, shorter than the sepals. May and June. *l.* almost glabrous, cordate, trifid; lobes ovate, mucronate by a bristle, and, as well as the petioles, glandless. North America, 1714. Hardy. (B. R. 79.)

P. macrocarpa (large-fruited). *fl.* white and purple. Summer. *fr.* of a delicate flavour, and acquiring a weight of 8lb. and upwards. *l.* large, oval, obtuse. Stem quadrangular. Rio Negro, 1866. A vigorous-growing climber. SYN. *P. Hulletti* (of gardens).

P. maculata (spotted). *fl.* greenish; pedicels solitary or twin, rather pilose. June and July. *l.* glabrous, deeply three-lobed, painted with white on the upper surface; lobes nearly equal, oblong, acute, upper ones bluntly trifid, intermediate one larger than the others; petioles glandless. Curassoa, 1820.

P. maliformis (Apple-form-fruited). Sweet Calabash. *fl.* of various shades, sweet-scented, large, and beautiful; petals white; rays blue; outer divisions of flower red; bracts ovate, acute, joined at the base, larger than the flower. July to November. *fr.* dingy yellow, round, smooth, about 2in. in diameter, full of agreeable, gelatinous, pale yellow pulp. *l.* glabrous, ovate, somewhat cordate at base, acuminated, entire; petioles biglandular. Tropical America, &c., 1731. (B. R. 94.)

P. marmorea (marbled). A garden synonym of *Ophiocaulon cissampeloides.*

P. Maximiliana (Prince Maximilian's). *fl.* greenish, with a white corona; pedicels solitary or twin, longer than the petioles. May and June. *l.* glabrous, divaricately bilobed, drawn out a little in the middle, somewhat cordate at base, red and biglandular beneath; petioles glandless. Brazil, 1800. SYNS. *P. discolor* (L. B. C. 565), *P. vespertilio* (B. R. 597).

P. Medusæa (Medusa's). A synonym of *P. jorullensis.*

P. Mooreana (Moore's). *fl.*, calyx tube short; limb of five oblong segments; petals white; corona with the outer ray blue, nearly as long as the petals, variegated below with white and darker blue; intermediate one deep blue, very short; inner one red-purple, erect; peduncles one-flowered. July. *l.* almost sessile, 3in. to 5in. long, cuneate, deeply palmato-trifid, obscurely serrate; stipules large, ovate. Buenos Ayres, 1837. (B. M. 3773.)

P. mucronata (mucronate). *fl.* white, with a yellowish corona; column inclined; stamens secund; pedicels twice the length of the leaves; bracts soon falling off. August and September. *l.* glabrous, roundish-cordate, entire; petioles biglandular in the middle; stipules ovate-lanceolate, setosely apiculated. Brazil, 1816. (B. R. 677, under name of *P. albida.*)

P. Munroi (Munro's). *fl.* 2in. to 3in. across; petals five, whitish externally, violet within, oblong, as long as the calyx lobes; corona in several series, violet, rich purple, and whitish. Summer. *l.* 3in. to 5in. long, 4in. to 6in. broad, palminerved, cordate at base, deeply three-lobed. 1868. A very elegant greenhouse hybrid between *P. alata* and *P. cærulea.*

P. Murucuia (Murucuia). *fl.* deep red, solitary, axillary. July. *fr.* flesh-coloured when ripe, size of a pigeon's egg. *l.* glabrous, glandular beneath truncately two-lobed at the apex; lobes obtuse, divaricate. West Indies, 1730. SYN. *Murucuja ocellata.* (B. R. 574.)

P. onychina (onyx-coloured). A synonym of *P. amethystina.*

P. organensis (Organ Mountains). *fl.* greenish-white, having a violet-coloured corona, tipped with white. Summer. *l.* having ovate, obtuse, lateral lobes, and a broad, very obtuse, central one, the under surface claret-coloured. Brazil, 1869.

P. o. marmorata (marbled). *l.*, upper surface prettily mottled with whitish or yellowish blotches. Brazil, 1869.

P. palmata (palmate). A synonym of *P. filamentosa.*

Passiflora—*continued.*

P. peltata (peltate-leaved). *fl.* greenish; calyx pale, large; corona filamentous; pedicels solitary, jointed about the middle. August and September. *l.* pubescent above, glandless, three-nerved, rather peltate, three-lobed beyond the middle; lobes lanceolate, divaricated; petioles biglandular in the middle. West Indies, &c., 1778. (B. R. 507.)

P. penduliflora (pendulous-flowered). *fl.* pale yellow and green; crown one-seriate, twelve to fourteen-partite; segments orange-coloured, much exceeded by the petals; pedicels simple, solitary or twin, often elongated, pendulous. August. *l.* roundish, slightly trilobed at the sinuate or sub-truncate top; lobes broadly rounded, mucronulate, erect. West Indies, 1848. (B. M. 4565.)

P. perfoliata (perfoliate-leaved). *fl.* on pedicels much exceeding the petioles; calyx crimson; petals oblong-lanceolate, exceeding the calyx; rays fleshy-green, with blunt, scarlet tips. April to September. *l.* velvety, cordate at base, two-lobed, with an awn in the recess between the lobes, glandless beneath, and on the petioles. West Indies, &c., 1831. (B. R. 78.)

P. phœnicea (crimson). A synonym *P. alata brasiliana.*

P. picturata (painted-leaved). *fl.* red; calyx lobes reflexed, twice the length of the filamentous crown; outer crown beautifully variegated with blue and white. September. *l.* sub-peltate, reddish beneath, three-lobed; lobes quite entire, mucronate by a bristle; recesses and petioles bearing four glands. Brazil, 1820. (B. R. 673; L. B. C. 1060.)

P. princeps (princely). A synonym of *P. racemosa.*

P. punctata (dotted), of Loddiges. A synonym of *P. tuberosa.*

P. quadrangularis (quadrangular-stemmed).* Granadilla. *fl.* highly odoriferous; calycine lobes white within; petals of the same shape, red within, and white outside; corona five-fold, the outer rays in a double row, longer than the petals, round, white, and variegated with violet; bracts entire. August and September. *fr.* greenish-yellow, oblong, about 6in. in diameter, containing a succulent, purple, edible pulp, of a sweet and slightly acid flavour. *l.* glabrous, cordate at base, ovate, acuminated; petioles bearing four or six glands; stipules ovate, entire. Branches tetragonally winged. Nicaragua, 1768. Largely cultivated in the tropics. (B. R. 14.) The variety *aucubifolia* has variegated leaves.

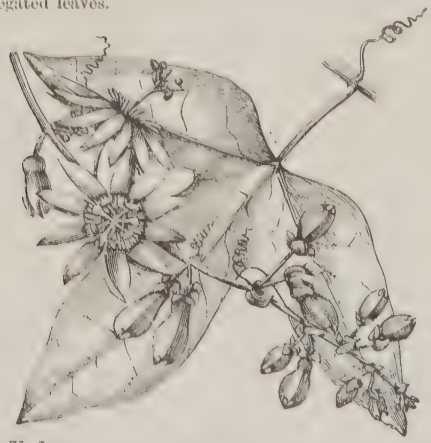


FIG. 35. LEAF AND INFLORESCENCE OF PASSIFLORA RACEMOSA.

P. racemosa (racemose).* *fl.* of a deep red or scarlet colour; pedicels twin, forming terminal, pendulous racemes; in consequence of the upper leaves becoming abortive. March to October. *l.* quite glabrous, rather peltate, glaucous beneath, for the most part trilobed; petioles usually bearing four glands. Brazil, 1815. See Fig. 36. (B. M. 2001; B. R. 285.) SYN. *P. princeps* (L. B. C. 84). *P. Madonna* is said to be a cross between *P. racemosa* and *P. Buonapartea*, the latter itself a hybrid between *P. alata* and *P. quadrangularis*. BIJOU is said to be a hybrid between *P. racemosa* and *P. Raddiana.*

P. Raddiana (Raddi's).* *fl.* richly coloured, produced in great abundance; calyx blood-colour, the segments linear-oblong, acute, the tube short; petals the same colour, and equal or slightly larger, flat, very spreading, at length reflexed; corona in one series of short, spreading, purple filaments; peduncles solitary, axillary, slender, much longer than the leaves. Autumn. *l.* trilobed, cordate, dark shining green above, vinous beneath; lobes serrulate at base; petioles terete, biglandular; stipules leaf-like, semi-cordate, sub-cirrhose at apex. Brazil. 1831. See Fig. 37. (B. M. 3503; B. R. 1633, under name of *P. kermesina.*) *P. Loudoni* is considered by Dr. Masters to be a cross between this species and *P. racemosa.* *P Comte Woronzoff* is said to be a form of *P. Raddiana.*

P. rubra (red-berried). *fl.* greenish-yellow; calyx exceeding the corolla; crown three-seriate, the exterior filaments reddish,

Passiflora—*continued.*

nearly as long as the petals; pedicels solitary; ovary hairy April to September. *fr.* red, hairy, ovoid or sub-globose. *l.* velvety, cordate at base, two-lobed, with an awn in the recess between the lobes, glandless beneath and on the petioles. Tropical America, 1831. (B. R. 95.)

P. sanguinolenta (blood-red). *fl.* reddish-violet, small, axillary, solitary; corona violet-coloured below, white at the tips. Summer. *l.* five-nerved, bilobed, with the lobes divergent. Columbia and Peru, 1868. A slender-growing climber.

FIG. 37. PASSIFLORA RADDIANA.

P. serratifolia (saw-edge-leaved). *fl.* with purple petals, the filaments of the crown pale purple at the base, and thence bluish; pedicels pubescent. May to October. *l.* pubescent beneath, ovate-lanceolate, acute, serrulated, feather-nerved; petioles pubescent, bearing four glands. Mexico, &c., 1731. (B. M. 651.)

P. sicyoides (Sicyos-like). *fl.* whitish, very fragrant; peduncles twin; bracts filiform, small, approximating the flower. July. *l.* cordate, three-lobed, sharply sub-dentate or quite entire, glaucous beneath, hairy, biglandular in the recesses, smoothish above; lobes triangularly acuminated, the middle one longest; petioles hairy, biglandular in the middle; glands large, clavate. Mexico and Brazil, 1838.

P. stipulata (stipuled). *fl.* whitish, the crown variegated with purple and white; peduncles about equal to the petioles; bracts entire. August and September. *l.* glabrous, glaucous beneath, cordate at base, five-nerved, trifid; lobes ovate, entire; petioles bearing two or four glands; stipules oblong, somewhat auricled, mucronate, entire. Brazil, &c., 1779. SYN. *P. glauca* (of Aiton). (B. R. 88.)

P. suberosa (cork-barked). *fl.* of a greenish-yellow colour, the short crown purple at the bottom; pedicels twin. June to September. *fr.* purple when ripe, ovoid. *l.* glabrous, somewhat ciliated, five-nerved at the base, ovate, somewhat cordate, usually three-lobed; lobes ovate, acute, the middle one larger than the rest; petioles biglandular above the middle. West Indies, &c., 1759.

P. s. angustifolia (narrow-leaved). *fl.* yellowish, with the rays purple at the base; pedicels solitary or twin. June to September. *l.* glabrous, glandless, somewhat peltate; lower ones ovate, the rest lanceolate, two or three-lobed; petioles short, biglandular above the middle. West Indies, 1773. (B. M. 1983; B. R. 188.)

P. s. minima (least). *fl.* greenish-yellow, with white rays; nectary fourfold; inner one with an entire, brown rim; outer

Passiflora—*continued.*

plaited, of a dusky purple colour; another ciliated with capillary, black hairs, with yellow tips, the outermost one having the filamentous appendages twice as long as the others, dark purple at base, and yellow from the middle to the tip; pedicels twin. July and August. *l.* glabrous, glandless, five-nerved, trifid; lobes ovate, the middle one drawn out most; petioles biglandular at the apex. Tropical America, 1690. (B. R. 144.)

P. s. pallida (pale-flowered). *fl.* yellowish-green, small; corona short; pedicels one to three together. August and September. *l.* glabrous, ovate, acuminated, three-nerved; petioles biglandular above the middle. Florida and West Indies. (B. R. 660.)

P. tinifolia (Laurestine-leaved). A synonym of *P. laurifolia.*

P. trifasciata (three-banded). *fl.* white, fragrant. Summer. *l.* trilobate, evergreen, marked down the centre of each lobe by a broad irregular band of reddish-purple, the back of the leaf being of a dark sanguineous hue. Para, 1868. (I. H. 544.)

P. tuberosa (tuberous-rooted). *fl.* greenish-white; outer corona green at the base, tipped with purple and white; style purple; pedicels twin. June to October. *l.* glabrous, glandular beneath, rounded at the base, three-nerved, three-lobed at the apex; the lower ones usually painted with white on the upper surface; lobes oblong, acute, the middle one very small; petioles glandless. Branches of root tuberous. South America, 1810. (B. R. 432.) SYN. *P. punctata* (L. B. C. 101).

P. tucumanensis (Tucuman). *fl.* about 2in. in diameter; petals white; corona doubly filamentous, the outer series white, barred with purplish-blue, equalling the petals; inner series white, tipped with blue, very short; bracts almost equalling the calyx segments, loosely cordate, serrate; peduncles one-flowered, tribracteate. July. *l.* broadly cordate, petiolate, trilobed; lobes oblong, deeply glandulose-serrate, glaucous beneath. Brazil, &c., 1836. Plant very glabrous. (B. M. 3636.)

P. vespertilio (bat-like). A synonym of *P. Maximiliana.*

P. vitifolia (Vine-leaved). *fl.* yellowish; outer corona orange-coloured; inner corona white; bracts glandularly toothed. July. *l.* downy beneath, cordate, deeply three-lobed; lobes ovate, acuminated, sharply toothed, with the sinuses biglandular; petioles biglandular at the base, pubescent. South America, 1823.

P. Weberiana (Weber's). *fl.* white, 2in. in diameter; filaments of corona banded with white; ovary densely setose; peduncles axillary, solitary. Summer. *l.* large, 3in. to 5in. long, 4½in. to 9in. broad, three-lobed; lobes broadly ovate-oblong, acute, sinuate-toothed, the base deeply cordate; stipules leafy, falcate-oblong. Stem covered with glandular hairs. Argentine Republic, 1885.

PASSIFLOREÆ. An order of trees, shrubs, or herbs, with watery juice, of variable habit, erect, climbing or twining, natives of tropical and sub-tropical regions, but most numerous in South America. Flowers solitary, racemose, or cymose-paniculate, usually showy, hermaphrodite or unisexual, usually regular; calyx tube short or elongated, coriaceous or herbaceous, persistent, in two cases absent; lobes three to many, coriaceous, valvate or imbricated; petals absent, or as many as the calyx lobes, inserted at the throat, tube, or base of the calyx, free, or connate in a campanulate corolla, induplicately valvate or imbricated; corona at the throat or base of the calyx simple or duplex, tubular, or cut into radiating or erect filaments, or rarely absent; disk urceolate or annular, rarely absent; stamens three to five, or rarely many, in a few cases many-seriate, perigynous, or inserted with the petals at the calyx throat, the filaments subulate or filiform. Fruit a many-seeded, dehiscent or indehiscent, berry or capsule. Leaves alternate or rarely opposite, petiolate, simple, lobed, palmately three to seven-foliolate, very rarely pinnate or decompound, sometimes glandular; stipules none or twin, deciduous or persistent; tendrils circinate or spirally twisted. Several species of *Passiflora* are of economic value, some of them having edible fruits. The order comprises nineteen genera and about 250 species. Examples: *Carica*, *Gynopleura*, *Passiflora*, and *Tacsonia.*

PASSION-FLOWER. *See* **Passiflora.** The term is also applied to the species of *Tacsonia.*

PASTINACA. Included under **Peucedanum** (which *see*).

PASTINACA OPOPONAX. A synonym of **Malabaila Opoponax** (which *see*).

PATAGONULA (from the name of the native country of the genus—Patagonia). ORD. *Boragineæ.* A genus comprising only a couple of species of greenhouse, glabrous or pubescent, South American shrubs. Flowers small, loosely corymbose, cymose at the tips of the branches; calyx broadly campanulate, five-fid above the middle; corolla campanulate-sub-rotate, semi-five-fid, with imbricated (not folded) lobes. Leaves alternate or clustered at the apices of the branches, entire or serrate, penniveined, reticulated. *P. americana*, the only species introduced, grows well in an equal mixture of loam and peat. It may be increased by cuttings, inserted in the same kind of soil, under a glass.

P. americana (American). *fl.* white or greenish-white, smelling like those of the Elder. June to August. *l.* glabrous on both surfaces, lanceolate or oblong-lanceolate, tapering into the short petioles, and sub-cuneated at the base, generally acute, rarely obtuse, at the apex; younger ones cuneate-obovate, entire or serrated towards the top; largest ones 2½in. long, margined. *h.* 10ft. to 12ft. 1732.

PATANA PALM. *See* **Œnocarpus Bataua.**

PATANIA. Included under *Dicksonia.*

PATCHOULI PLANT. A common name of **Pogostemon Patchouli** (which *see*).

PATELLIFORM. Shaped like the patella or knee-pan; disk-shaped; circular, with a rim.

PATENS, PATENT. Spreading widely open, or diverging widely from an axis.

PATERSONIA (named after Col. W. Paterson, an English traveller in South Africa of the last century). SYN. *Genosiris.* ORD. *Irideæ.* A genus comprising nineteen species of handsome, greenhouse, perennial herbs, with short rhizomes, all natives of extra-tropical or sub-tropical Australia. Flowers two or several in a spathe, rarely solitary, sessile or very shortly pedicellate; perianth blue, or very rarely yellow or white; tube slender, sometimes long; three outer lobes broad and spreading; three inner ones small, erect, sometimes minute or absent; bracts membranous, more or less scarious. Leaves radical, or clustered at the base of the stems, distichous, narrow-linear, grass-like or rigid. The best-known species are described below. They thrive in a sandy-peat compost. Propagation may be effected by division, or by seeds.

P. glabrata (glabrous). *fl.* purple; perianth tube shortly exceeding the bracts; scapes or peduncles one or sometimes two to the stem, rarely exceeding the leaves. June. *l.* distichous; lower ones very short; upper ones 6in. to 12in. long, rarely above two lines broad. Stem slender, 3in. to 6in. high. 1814. SYN. *P. media.* (L. B. C. 768.)

P. glabrata (glabrous), of "Botanical Register." A form of *P. sericea.*

P. glauca (glaucous). *fl.* blue; perianth tube exceeding the bracts by three to five lines; spike with the two outer bracts 1½in. to 1¾in. long, each spikelet bearing three or four flowers; scapes usually much shorter than the leaves, but occasionally exceeding them. June. *l.* rigid, erect, the longest from 6in. to 18in. long, and nearly two lines broad. Stems very short, clustered on the rhizome, with a few outer scales gradually passing into leaves. 1820. (B. M. 2677; L. B. C. 1182.)

P. media (intermediate). A synonym of *P. glabrata.*

P. occidentalis (Western). *fl.* usually numerous, rarely only three, in each spikelet; perianth rich blue, the tube shortly exceeding the bracts; outer bracts 1½in. or more long. May. *l.* rigid, the longest often above 1ft. long, usually two to three lines broad. Stems very short. 1824. (B. R. 1839, 60, under name of *P. sapphirina.*)

P. sapphirina (sapphire-colour-flowered). A synonym of *P. occidentalis.*

P. sericea (silky). *fl.* deep violet-blue, in a stout and usually many-flowered spike; outer segments of limb broadly ovate; inner ovate or lanceolate; outer bracts 1½in. to 2in. long, at first silky-woolly; scapes usually about 1ft. high. June. *l.* radical, long, erect, and rigid, rarely above two lines broad, the edges very woolly at base when young. Stems scarcely any. 1803. (B. M. 1041.) *P. glabrata* (B. R. 51) is regarded, by Bentham, as merely a glabrous form of this species.

PATHS. Narrow walks intended for dividing up vegetable quarters, &c., and affording facilities for executing work more readily. They vary in width

Paths—*continued.*

from 1½ft. to 3ft., but are subordinate to all main walks in a large garden, and frequently are not made with anything beyond the ordinary soil. Where Paths are intended to be permanent, they may be much improved if a shallow bed of clinkers, or rough gravel, is laid down, and covered with finer gravel, or ashes. The term Paths, or alleys, further denotes the divisions allowed between seed-beds.

PATIENCE, or HERB PATIENCE (*Rumex Patientia*). A hardy perennial, native of Europe, &c., the leaves of which were formerly much used in the place of Spinach, and, in the early part of the season, as a substitute also for Sorrel. It may readily be raised from seed, sown about March, in drills 1½ft. asunder, the plants being eventually thinned to 1ft. apart in the rows; or seeds may be sown broadcast, and the seedlings afterwards transplanted at similar distances. Division of an established stock may also be practised. To maintain a supply of young leaves, which alone are of any use, the stems should be occasionally cut over. This will also prevent the ripening and distribution of seed by the wind. A good soil, and a rather moist situation, are most suitable, but the plants grow well under almost any circumstances.

PATRINIA (named in honour of E. L. Patrin, 1742-1814, French traveller in Siberia, &c.). SYNS. *Fedia* (of Adanson), *Mouffetta*. ORD. *Valerianeæ*. A genus of erect, glabrous or loosely villous, hardy, perennial herbs. About nine or ten species have been proposed, but several authors reduce these as varieties of two only; they are natives of Central and extra-tropical Eastern Asia. Flowers disposed in corymbose-paniculate cymes; calyx limb small, obtusely sub-dentate; corolla yellow, with a very short tube, and a limb of five spreading lobes. Leaves once or twice pinnatifid or pinnatisect; radical ones rarely entire. The plants described below are those best known to gardeners. They will succeed in any light, rich soil; and may be increased by seeds.

P. rupestris (rock-loving). *fl.* fragrant, smaller than those of *P. sibirica*; corymbs sub-umbellate. May and June. *l.* membranous, pinnatifid; segments lanceolate, the terminal one large. Stem smoothish or rather downy. *h.* 1ft. Siberia, 1801. (B. M. 714, under name of *Valeriana sibirica.*)

P. scabiosæfolia (Scabious-leaved). *fl.* disposed in loose, rather panicled corymbs. May to July. *l.*, radical ones ovate or oblong, deeply serrated, pilose; stem ones pinnatifid, with lanceolate-linear, acute segments, the terminal one being very long. Stem glabrous. *h.* 1ft. Northern Asia, 1817. (L. B. C. 1340; S. B. F. G. 154.)

P. sibirica (Siberian). *fl.* with a fragrance somewhat like that of Jessamine. May and June. *l.* rather fleshy; radical ones spathulate, entire, toothed or serrated, but sometimes pinnatifid at the apex; cauline ones pinnate, with entire, usually obtuse, segments. Stem glabrous. *h.* 1ft. Siberia, &c., 1751. (B. M. 2325, under name of *Valeriana ruthenica.*)

PATRISIA. A synonym of **Ryania** (which *see*).

PATTONIA. A synonym of **Grammatophyllum** (which *see*).

PATULOUS. Moderately spreading.

PAUCIFLORUS. Few-flowered.

PAUCIFOLIUS. Few-leaved.

PAULLINIA (named after Ch. Fr. Paulli, 1643-1742, a Danish botanist). ORD. *Sapindaceæ*. This genus comprises about eighty species of climbing and twining, evergreen, stove shrubs, confined, with one or two exceptions, to the tropical regions of the Western hemisphere. Flowers pale, small, in axillary racemes; sepals five, concave, imbricate; petals four, bearing scales inside near the base; stamens eight. Fruit a pear-shaped, three-sided, one to three-celled capsule, with thin partitions. Leaves alternate, stipulate, compound, one to three, ternate or pinnate, or decompound; leaflets often toothed, dotted, or lined; petioles often winged. Paullinias thrive in a soil consisting of loam and leaf mould. Propagation is effected by cuttings, made of ripe shoots, and inserted under a

Paullinia—*continued.*

bell glass, in bottom heat. The majority of the species are not worth cultivating, but the two here described will be found desirable subjects for the stove.

P. oceanica (Oceanian). *l.* slender, linear, equally or unequally pinnate; pinnæ sometimes simple, ovate, inciso-dentate, sometimes ternate, with a larger terminal and two smaller lateral leaflets; sometimes there is a slight wing developed upon the rachis near the insertion of the upper pinnæ. Stems dark-coloured. South Sea Islands, 1875. A garden name.

P. thalictrifolia (Thalictrum-leaved). *fl.* very pale pink, ⅛in. in diameter, in small clusters. October. *l.* 4in. to 10in. long, deltoid-ovate in outline, three-ternately-pinnate, pubescent, the main rachis angular, partially flattened or obscurely winged; pinnæ in six to eight pairs, narrow-ovate, the upper ones linear; pinnules four to eight pairs, ¾in. to ⅝in. long. Stem terete, slender; branches velvety-tomentose. *h.* probably many feet. Rio de Janeiro, 1871. A beautiful climber. (B. M. 5879.)

P. t. argentea (silvery). *l.* like those of the type, but suffused with a silvery white. A splendid variety. (B. H. 1880, p. 343.)

PAULOWNIA (named in honour of Anna Paulowna, Princess of the Netherlands, daughter of Paul I., Emperor of Russia). ORD. *Scrophularineæ*. A monotypic genus, the species being a very handsome, hardy, deciduous tree, with the habit of *Catalpa*. It does well in any good soil, and may be increased by cuttings, or by imported seeds, sown in a cold frame; the seedlings should be planted in the open ground when sufficiently large. On account of the dull colour of its downy leaves, and the flowers appearing too early for our climate, the tree is not so much grown as formerly.

FIG. 38. FLOWERING BRANCH OF PAULOWNIA IMPERIALIS.

P. imperialis (Imperial).* *fl.* showy; corolla pale violet, with dark spots on the inside, 1½in. to 2in. long, with an elongated tube, and a five-lobed, spreading limb; panicles terminal, with opposite, many-flowered branches. June. Capsule usually 1in. long, ovoid, acuminate. *l.* opposite, entire or three-lobed, broad, soft, villous or pubescent, 6in. to 12in. long. Branches horizontal, tortuous. *h.* 30ft. Japan, 1840. See Fig. 38. (B. M. 466.)

PAVETTA (the vernacular name of *P. indica* in Malabar). SYNS. *Baconia, Crinita, Verulamia.* ORD. *Rubiaceæ*. A genus comprising about sixty species of glabrous, pubescent, or tomentose, stove or greenhouse, shrubs or small trees, indigenous in the tropics, and also found in South Africa. They are closely allied to *Ixora*, but the lobes of the corolla are twisted in the bud; the style projects for some distance from the corolla, and is terminated by a club-shaped stigma. Flowers white or greenish, disposed in trichotomously-branched corymbs, rarely capitate, often bundle-flowered,

Pavetta—*continued.*

axillary or terminal. Fruit fleshy, two-stoned. Leaves opposite, petiolate, usually membranous. The following species are sometimes seen in cultivation. For culture, *see* **Ixora.**

P. borbonica (Bourbon). *l.* opposite, oblong-lanceolate, 6in. to 10in. long; ground colour dark olive green, thickly studded all over the surface with white spots, which are shaded with a very light green; midrib bright salmon-red. Stem erect and usually simple. Isle of Bourbon. A very ornamental-leaved, stove plant, respecting which the "Gardeners' Chronicle" remarks: "*Pavetta borbonica* is a nursery name for a distinct and beautiful plant frequently found in gardens, of which no identification has yet been possible, because, so far as known, no flowers have been produced in cultivation."

P. caffra (Caffrarian). *fl.* white, sub-umbellate; corymbs terminating in short branches. June to August. *l.* obovate, almost sessile, glabrous. *h.* 3ft. to 4ft. Cape of Good Hope, 1823. A beautiful greenhouse shrub when in flower. SYN. *P. corymbosa.* (B. M. 3580.)

Pavetta—*continued.*

P. corymbosa (corymbose). A synonym of *P. caffra.*

P. indica (Indian). *fl.* white; panicle terminal, sub-corymbose, with opposite branches. August to October. *l.* oval-oblong, acuminate at both ends, petiolate. *h.* 3ft. to 4ft. India, &c., 1791. Stove shrub. (B. R. 198.)

PAVIA (named in honour of Peter Paiv, a Dutch botanist, professor at Leyden in the seventeenth century). Buckeye; Smooth-fruited Horse Chestnut. ORD. *Sapindaceæ.* A small genus of hardy, deciduous trees and shrubs, included, by Bentham and Hooker, under *Æsculus.* Calyx tubular; petals four, erect, narrow; stamens straight. Capsules unarmed. Leaves petiolulate. For culture, *see* **Æsculus.**

P. alba (white).* *fl.* white, disposed in a very long raceme; stamens six or seven, three times as long as the corolla; claws of the nearly similar petals longer than the obconical calyx. April and May. *l.* composed of five to seven oval-obovate leaflets,

FIG. 39. FLOWERING BRANCH, DETACHED LEAF, FLOWER, AND YOUNG FRUIT OF PAVIA CALIFORNICA.

Pavia—*continued.*

tomentose beneath. *h.* 3ft. to 9ft. North America, 1820. Shrub, with stoloniferous roots. SYNS. *P. macrostachya, Æsculus macrostachya* (B. M. 2118), *Æ. parviflora.*

P. californica (Californian).* *fl.* white or pale rose, highly fragrant, covering the dense head of the tree; stamens five to seven; anthers orange-coloured. May. *l.*, leaflets smooth, oblong-lanceolate, acute, obtuse at base, serrulate, with slender petiolules. California. A very handsome species; usually a shrub, 12ft. to 15ft., sometimes a tree, 40ft. high, with a dense head, much more in diameter. See Fig. 39.

P. discolor (discoloured). A synonym of *P. flava purpurascens.*

P. flava (yellow).* Sweet Buckeye. *fl.* pale yellow; stamens included within the four-petaled corolla. May. *l.* on pubescent petioles, which are rather flat above; leaflets five or seven, elliptic-oblong, acute at both ends, pubescent beneath and on the nerves above. *h.* 20ft. North America, 1764. A large tree or shrub. (B. R. 1009, under name of *Æsculus neglecta.*)

P. f. purpurascens (purplish). *fl.* tinged with red or purple. SYNS. *P. discolor, P. hybrida.* (B. R. 510, under name of *Æsculus discolor.*)

P. hybrida (hybrid). A synonym of *P. flava purpurascens.*

P. macrostachya (large-spiked). A synonym of *P. alba.*

FIG. 40. FLOWERING BRANCH OF PAVIA RUBRA.

P. rubra (red). Red Buckeye. *fl.* bright red, disposed in an oblong panicle; stamens shorter than the corolla. May. *l.*, leaflets five, elliptic-oblong, acute at both ends, and, as well as the petioles, glabrous, slightly pilose in the axils of the nerves beneath. *h.* 10ft. North America, 1711. Shrub or small tree. SYN. *Æsculus Pavia.* See Fig. 40. (B. R. 993; W. D. B. 120, 1643.) Of this, there are three varieties: *humilis*, 6ft. high; *pendula*, with pendulous branches; and *laciniata*, with deeply cut leaves.

PAVONIA (named after Don Jose Pavon, a Spanish traveller in Peru, one of the authors of "Flora Peruviana et Chilensis"; he died in 1844). Including *Lebretonia* and *Lopimia.* ORD. *Malvaceæ.* A genus comprising upwards of sixty species of tomentose, hispid, or glabrescent, stove herbs or shrubs. Ten or eleven are natives of Africa, tropical Asia, or the Pacific Islands; the rest are all indigenous to South America or the warmer parts of North America, one of the South American species being also found in Australia. Flowers of various colours, pedunculate or in congested heads at the apices of the branches; calyx five-fid or five-toothed; petals spreading or convolute-connivent. Leaves often angular or lobed. Few of the species have any horticultural value. They thrive in any light, rich soil. Cuttings will root readily

Pavonia—*continued.*

if inserted in sand, under a glass; increase may also be effected by seeds. All the under-mentioned species are shrubs.

P. malacophylla (soft-leaved). *fl.* scarlet, axillary, solitary or crowded at the tips of the branches; corolla flat. February. *l.* orbicular, cordate, coarsely toothed. *h.* 4ft. New Grenada, 1823. (B. M. 4365, under name of *Lopimia malacophylla.*)

P. multiflora (many-flowered).* *fl.* solitary in the upper axils, and forming a short, terminal corymb; bracteoles red, hairy, numerous below the flower, whorled, longer and narrower than the purplish calyx segments; petals dull purple, 1in. to 1½in. long, rolled together, narrowly obovate-oblong. September. *l.* alternate, 6in. to 10in. long, 1½in. to 2in. broad, narrowly oblong, or obovate-lanceolate, long-acuminate, serrulate or denticulate; petioles 1½in. to 3in. long. Brazil. A robust plant. (B. M. 6398.)

P. Schrankii (Schrank's). *fl.* on solitary, axillary peduncles; corolla orange-coloured, yellow at base, above 1½in. long, 2in. across; petals imbricated and convolute. July. *l.* scattered, spreading wide, 3½in. long, 1½in. broad, ovate, sub-cordate at base, acuminate. Branches erect. *h.* 2ft. Brazil, 1823. (B. M. 3692.) SYN. *Lebretonia coccinea.*

P. Spinifex (prickly-fruited). *fl.* yellow; pedicels axillary, one-flowered. July and August. *l.* ovate, acuminate, almost cordate, doubly toothed. Warm parts of America, 1778. (B. R. 339.)

P. Makoyana and *P. Wioti* (B. H., 1875, vii.) are species of *Goethea.*

PAVONIA (of Ruiz and Pavon). A synonym of **Laurelia** (which *see*).

PAXTONIA. Included under **Spathoglottis** (which *see*).

PEA. A common name for various members of the *Papilionaceæ* family.

PEA (*Pisum sativum*). A hardy annual, one of the most valuable and best known of leguminous plants, and one which has been in cultivation from remote antiquity. Its origin is unknown; probably, however, the early home of the species was Western Asia. It is supposed to have been introduced into this country from the South of Europe, about the time of Henry VIII. The uses to which the seeds are put, as an article of food, both in a young, green state, and after being matured and dried, are familiar to everyone. Used in either way, they are very nutritious. Dried Peas, in days long past, formed a more important article of food than at the present time, especially amongst the working classes. They have been replaced very considerably by Potatoes since the cultivation of that vegetable has become so generally adopted. It is to the production and supply of green Peas that cultivators now more particularly devote their attention, and a continued succession of crops becomes necessary in order to maintain an unbroken supply. Green Peas, very early in the season, are justly considered a great delicacy, and gardeners vie with each other in using every means in their power to supply a dish as early as possible. To this end, it is important that only suitable early varieties be grown, and that they should receive more than ordinary attention in spring, and until their produce is fit to gather. Mid-season and late varieties bear longer in succession than early ones, and various heights also make considerable difference respecting the time taken in perfecting their crops.

CULTIVATION. The Pea crop is best provided for by a rich, loamy soil, amongst which plenty of calcareous matter, such as lime, chalk, &c., should be incorporated. It should be of a good depth, in order that the roots may penetrate for a supply of moisture, should the surface become dry. This is of great importance in summer, as then the plants require plenty of moisture, and if the supply is insufficient, mildew invariably attacks the leaves, and the pods rarely fill satisfactorily. Manure is best suited for Peas when applied to a previous crop; should ground of such a description be unavailable, or the position unsuitable, it would be best to thoroughly trench, and add horse, or ordinary farmyard, manure at about 1ft.

Pea—*continued.*

beneath the surface. Some cultivators prepare trenches, in which such manure is laid at the bottom, and covered in with the soil previously taken out. For main and late crops, this plan has been found very successful, because by it the roots are provided with an extra amount of nutriment and moisture at a time when they most require it. Efficient drainage is, however, important, and the surface should be kept open for the reception of all the rainwater available. The treatment varies somewhat with the seasons, the time when the seeds of successional crops are sown, and when they are intended to come to perfection. For the earliest supply, a warm, rather lighter soil, and a more sheltered position, are requisite, compared with what is suitable later in the season. Drills for Peas should be drawn flat and rather wide, say 6in. at the bottom, and at a uniform depth of about 2½in., or a little deeper for large-seeded kinds. When sown in autumn, too, a greater depth is recommended than for spring; but the soil filled in should first be rendered somewhat fine, in order that the young seedlings may readily find their way through it. If the seeds are good, they should not be sown too thickly, particularly the strong-growing, late sorts. As a general guide, a pint of good seed of an early or medium-growing Pea should sow from twelve to fifteen yards run, a similar quantity of a late sort being equalised over a further length of about ten yards; provided that, in either case, most of the seeds are likely to grow. The distance apart for the rows depends on the height to which the variety is expected to grow, and the space available. Rows of Peas, sown some distance from each other, and the intervening space occupied with another crop, is an excellent system, much practised, with the result that a more abundant yield is obtained than when the rows are very near each other. This plan does not, however, answer so well for early supplies, because the necessary shelter would not be insured. For these, a sunny south border is requisite, and, in order to subject each row to an equal amount of sunshine, and also utilise the whole border, so far as the quantity of seed reaches, it is generally most convenient to sow in an oblique direction across the border, allowing the lines to run in the direction from south-east to north-west, the space allowed between each two rows being about equal to the estimated height that the sort of Peas sown will reach. When Peas are provided with sticks on which to climb, as is usually the case with those grown in gardens, it is very important that the plants should not be allowed to fall about or become bent before the sticks are inserted, else they seldom take hold properly. Earthing-up should first be practised, lightly, when the seedlings are a little above ground, and again before the sticks are inserted. When dwarf sorts are cultivated, and allowed to grow on the ground—a plan not in any case recommended, except for field or market-garden culture on a large scale—the earth should be drawn more to one side than the other, in order to encourage all the plants to turn in one (the opposite) direction.

The seeds of Peas require some protection against the depredations of mice; otherwise, they are in danger of being entirely demolished even before germination takes place. To prevent this, various plans have been devised. Some merely cover the seeds of early sowings with a little good soil, and then with, say, 2in. of sharp sand or sifted coal ashes, these substances not being readily burrowed into by mice. As a preventive, the seeds should always be placed in a little sweet oil, and afterwards covered with dry red lead, which will then adhere to their surface; powdered resin has also been recommended for use in a somewhat similar way. For other methods of lessening the harm done by mice, *see* **Mice.** Small birds are very destructive to the young plants when they are just issuing from the ground, by clipping off a great part, or sometimes the whole, of their heads. Pea-guards,

Pea—*continued.*

made by fixing ordinary wire netting on a framework with semi-circular iron hoops attached, are most useful for placing over the rows until danger is past. Failing these, small black threads, fixed a couple of inches above the young plants, and stretched as tightly as the material admits, will often prove an effectual preserver. The smaller and more invisible such threads are, the better, as, if they are large enough to be easily seen, small birds pass under them unscared, and carry on their disastrous practices underneath. In some localities, particularly near shrubberies and large trees, birds are very destructive to the Pea crop when it begins to be fit for gathering. Numerous plans are adopted for lessening the amount of destruction by scaring the birds, but it is seldom altogether prevented when once commenced, except by covering the whole with netting; this is usually kept at a fair distance off by the Pea-sticks themselves. An occasional discharge of a gun has also proved instrumental in warding off such unwelcome visitors amongst green Peas as hawfinches, blue tits, and sparrows.

Earliest Crops. In gardens generally, some time during the month of May is as early as a gathering of green Peas can be expected, and not unfrequently, in an unfavourable season, June has considerably advanced before many dishes are procurable. As before stated, great attention is accorded to early Pea culture, but, at times, the very earliest crops are exceedingly precarious. There are many methods of forwarding and protecting; but, first of all, it is imperative that only suitable early sorts must be sown. Dwarf Peas are sometimes forced in large pots under glass, but the system is scarcely worth pursuing, except for the possibility of securing a satisfactory result, the latter being by no means certain. Nothing approaching a high temperature should be allowed, nor must a close atmosphere be permitted. Failure is not unfrequent, in consequence of the flowers failing to set in winter time. In spring, some pots might be utilised, and an early—though very limited—supply obtained in advance of any from outside. Forcing of Peas under glass must not be attempted before the pods are set; they will not withstand anything beyond forwarding in a cool, airy, and light situation. For earliest crops outside, a south border, duly sheltered by a high wall, or fence, may be selected, the ground prepared, and seeds sown about the middle of November. With a view to providing for mishaps through winter, it is advisable to sow more thickly at this season than has been already recommended. As the young plants appear, some of the earth on either side should be drawn up to form a slight ridge, which should be increased in height by a similar process when a little more growth has been made. Shelter must also be afforded, especially on the northern side, by the insertion of short sticks, or branches of evergreens. Young Pea-plants will, under certain circumstances, bear considerable frost without injury, but they can ill withstand a cutting wind. In very severe weather, a light covering of dry bracken, or similar material, should be thrown over them to prevent the ground becoming much frozen. Staking affords of itself a great amount of shelter, and should be attended to so soon as the plants are sufficiently high. A few evergreen branches will still prove valuable on the more exposed sides of the rows. Should this sowing succeed, and make satisfactory progress, the spaces between the rows should be deeply hoed early in spring, when the surface is in a fairly dry condition, and has become somewhat warmed by sunshine. Another sowing should be made in January, should weather and circumstances permit, and still an equally well-sheltered situation should be chosen. It not unfrequently happens, in a favourable spring, that this sowing nearly overtakes that sown in autumn by the

Pea—*continued.*

time the produce is fit for gathering. Still, a few days are then generally considered of great importance. Where space and plenty of 4in. pots are available, it is a tolerably common practice to sow under glass early in February, with the intention of transplanting outside in March. Half-fill the pots with any fairly rich soil, scatter from eight to twelve seeds over the surface, then fill up with soil, and stand the pots in a cold frame, where air may be admitted on all favourable occasions. Treated in this way, the plants become much sturdier than when artificial heat is applied, and may be eventually planted out with a far greater chance of success. Favourable weather should be selected for transferring them outside, and, in planting, the balls may be inserted intact, or gently pulled in halves, and the latter planted separately. A warm position is necessary for Peas thus started at the commencement; earthing-up and protection are also essential so soon as they are planted out. Young seedling Peas transplant readily; consequently, it is advisable to fill up blanks, and make rows good, so far as the stock at command admits.

Successional and Main Crops. Once the supply of green Peas is commenced, it is most important that it should be kept up so far as possible. To this end, varieties, differing in height and description, and successional sowings, must, collectively, be made to contribute. Successional sowings of one sort during the two first months of the year and part of March will, as a rule, vary but little in the time of bearing, whereas if three or four sorts, varying in height and other particulars, are sown at the same time, a succession in bearing is more likely to be assured. From the end of March until June, sowings for main crops should be made at intervals of about three weeks, according to locality, and other circumstances not under control. Some make a sort of rule to sow again when the previous sowing is just appearing above ground; but this is not always a certain guide, as the weather would have a variable effect in different seasons and localities. For successional and main crop Peas, a position in one of the best parts of the garden quarters should be reserved, and the ground previously prepared, if unfit for their requirements. The drills for these should proceed in a direction from north to south. When earthing-up, the soil should be drawn just up to the plants, and left in a ridge on either side, with a view to retaining all rain or other water, instead of allowing any to run off.

Late Crops. To continue the succession into autumn, and maintain a supply, is not always an easy matter; still, it is very important that every attempt at doing so should be made. Strong-growing, tall and dwarf Marrow Peas are best suited for the purpose; and the trench system, with manure placed beneath, in the way already described, is the best method of cultivation. The great cause of failure is mildew on the plants, and this may be considerably prevented by providing a good depth of soil, and plenty of moisture beneath, where the roots penetrate. A mulching of rotten manure is of material help in preventing evaporation; it should be about 3in. deep, and laid on the surface for 1ft. or more on each side of the rows. In favoured localities, sowings for late crops may be made from the middle till the end of June; but, in northern parts, the beginning of June is sufficiently late for allowing the plants to blossom and bear anything like a crop. Some cultivators sow second early sorts late in the season, because of the likelihood of their turning in more quickly; but the plants lack the strength of late kinds, and the produce is also much inferior in quality. Tall sorts, grown late, should be stopped when about 4ft. high, in order to promote fruitfulness at an earlier stage than would be likely under ordinary circumstances. A sowing of late

Pea—*continued.*

sorts should also be made, first in April, and secondly in May.

All Peas are benefited by an occasional dressing of soot and a little lime on the surface, previous to and at the time when they are pushing through the ground. It tends greatly to ward off slugs, and is by no means agreeable to birds and mice. Should watering become necessary in summer, a thorough soaking should be given, and this applied at too late a stage is but of little use. When gathering Peas for use, only such as are fit should be selected, the whole stock of one sort being looked over each time, in preference to picking a portion severely, and leaving others alone possibly to become too old. Pea-sticks should be as strong and thin in proportion as may be procurable, and used at about the heights different sorts are calculated to reach. They should be firmly inserted in a slanting direction, the set

FIG. 41. GARDEN VARIETY OF PEA (*Pisum sativum*), with Flowers and Pods in different stages of development.

on one side pointing in an opposite direction to the other, yet at about the same angle. The leaf-tendrils clasp and retain a firmer hold on sticks thus arranged than they do on others inserted vertically. A few small branches near the base are instrumental in assisting the plants to commence climbing.

SORTS. Varieties of Peas are become exceedingly numerous, and several new ones are still annually put into commerce. Few vegetables have been so greatly improved during the last few years as Peas, particularly in the direction of introducing the superior-flavoured Marrows amongst the earlier sorts that were originally all small and round-seeded. There are different methods adopted for arranging Peas in classes for reference and distinction. Formerly, the smooth or round-seeded kinds were far more numerous than those with wrinkled seeds; now they are nearly equally represented. White,

Pea—*continued.*

green, and blue wrinkled Marrows are severally distinguished by their dried seeds being compressed, wrinkled, and of the colours given. Sorts with their dried seeds round or roundish in shape are mostly either white or blue; in some, they are small, with thin skins; others are large, and have thick skins. Peas retain their germinative powers for three years, some sorts for a longer period. Wrinkled seeds do not germinate so readily as round ones, nor do they keep good so long. The habit of growth and mode of bearing which Peas assume is represented in Fig. 41. Respecting the periods when sorts which are sown at different times may generally be expected to produce their crops, much depends on the season, locality, soil, and various other circumstances. The earliest round Peas, sown in autumn, or very early in January, may be expected to be ready by about the end of May; others, sown in January and February, should follow about the middle of June. Dwarf Marrows, sown during the early part of March, should come in early in July; and sowings of tall Marrows, made in succession from about the beginning of April, should similarly succeed each other in bearing from the middle of July onwards. Subjoined is a limited selection from amongst the principal sorts in cultivation, arranged for convenience according to the different seasons in which they come in bearing. An asterisk denotes a sort specially recommended.

Earliest Sorts.

Alpha (Laxton's).* Wrinkled blue Marrow. Pods produced singly, occasionally in pairs, long, narrow, much curved and pointed, each containing from six to nine good-sized peas, of fine quality. *h.* 3ft. to 3½ft. One of the best early wrinkled Marrows.

American Wonder.* Wrinkled Marrow. Pods produced singly or in pairs, about 2in. long, straight, well-filled. *h.* 9in. to 12in. An excellent first-early variety, of compact habit and fine flavour.

Beck's Gem. Seeds round, white, smooth. Pods generally in pairs, straight, nearly round, containing about six tolerably large peas. *h.* seldom exceeding 1ft. Very prolific.

Blue Prussian. Seeds round, light blue, smooth. Pods mostly in pairs, seldom solitary, about 3½in. long. *h.* 3ft. to 3½ft. An old, very prolific variety, grown extensively for market.

Daniel O'Rourke.* Seeds round, white, smooth. Pods straight, solitary, generally from eight to ten on a plant; peas rather large. *h.* 2ft. to 2½ft. A well-known early variety, sometimes called SANGSTER'S No. 1.

Dr. Hogg.* Wrinkled green Marrow. Pods borne singly or in pairs, long, much curved, containing from seven to nine large peas, of excellent quality. *h.* 3½ft. to 4ft. One of the earliest wrinkled Marrows.

Earliest of All (Laxton's). Seeds round, blue. Pods produced in pairs. *h.* 2ft. to 2½ft. A heavy cropper, of excellent quality. The earliest round blue variety.

Early Dwarf Frame. Seeds round, white, smooth. Pods mostly solitary, about 2in. long, slender. *h.* about 10in. A dwarf, productive variety, suited for culture in frames.

Early Frame. Seeds small, very round, white. Pods straight, well filled, generally containing six peas in each, of excellent quality. *h.* 3ft. to 3½ft. An early, hardy variety, with numerous synonyms.

Early Sunrise (Day's).* White wrinkled Marrow. Pods long, nearly straight; peas large for an early variety. *h.* 2½ft. to 3ft. Compact, bushy habit; hardy, and very prolific.

Maclean's Blue Peter. Seeds round, blue. Pods sometimes single, sometimes in pairs, rather over 2in. in length, each containing from six to eight very large peas. *h.* not exceeding 1½ft. A very dwarf variety, with dark green foliage. A few days later than the EARLY DWARF FRAME.

Maclean's Little Gem.* Green wrinkled Marrow. Pods produced in pairs, broadish, nearly straight, well filled. *h.* 1ft. to 1½ft. An excellent cropper, dwarf, very early, and of good quality. Fine for forcing.

Ringleader.* • Seeds round, white, smooth. Pods straight, usually solitary, each containing six or seven peas. *h.* 2½ft. to 3ft. Habit slender. This is considered one of the best early smooth Peas for outside culture, and is rather a remarkable variety, inasmuch as the first flowers either do not expand properly, or remain until those above are also ready to open. The flowering and bearing seasons are thus limited, the whole crop turning in nearly at once. A good early sort, extensively cultivated; also known as CARTER'S FIRST CROP. DICKSON'S FIRST AND BEST is rather larger, and perhaps more productive, than RINGLEADER; it is, however, much like it, but a few days later.

Pea—*continued.*

William the First.* Smooth, green-seeded Marrow. Pods borne singly and in pairs, nearly 3in. long, narrow, curved at the point; they are deep green, covered with a thick bloom, and each contains from seven to nine good-sized peas, of excellent flavour. *h.* 4ft. to 5ft. An exceedingly valuable variety; one of the earliest and best Marrows.

Second Early and Main Crop.

Advancer (Maclean's).* Wrinkled blue Marrow. Pods generally in pairs, slightly curved, containing about eight very large, compressed peas, which are of first-class quality. *h.* 2ft. to 2½ft. An excellent early Marrow, which turns in a few days after Laxton's ALPHA.

Champion of England.* Wrinkled blue Marrow. Pods sometimes solitary, but generally produced in pairs, long, slightly curved and flattened, each containing from six to nine peas, closely packed and compressed. *h.* 5ft. to 6ft. A strong-growing, abundant-bearing, climbing Pea, of great excellence; one of the best for general use.

Dickson's Favourite. Seeds round, smooth-skinned. Pods generally in pairs, medium-sized, long, well filled. *h.* 4ft. to 5ft. An abundant bearer and good sort.

Dr. Maclean.* Blue wrinkled Marrow. Pods very large, handsome, well filled with about nine very large peas of excellent quality. *h.* 3½ft. to 4ft. One of the finest wrinkled Marrows, coming in after ADVANCER. Very robust in habit.

Duke of Albany. Wrinkled green Marrow. Pods usually produced in pairs, nearly 4in. long, straight, very thick, well filled with about ten large peas. *h.* 5ft. to 6ft. Vigorous growing and productive.

Fillbasket (Laxton's). Seeds round, light green when ripe. Pods generally in pairs, very long, curved and pointed at the end, closely filled with from seven to nine good-sized peas. *h.* 3ft. Of vigorous growth, with branched stems and distinct, large, yellowish-green leaves.

G. F. Wilson (Carter's).* Wrinkled blue Marrow. Pods borne singly and in pairs, large, nearly straight, from 2in. to 3in. long, usually containing not more than from six to eight peas, which are, however, very large, oblong, and somewhat flattened. *h.* 4ft. An excellent cropper, of robust habit.

Gladiator.* Wrinkled Marrow. Handsome pods, produced in pairs, long, curved, closely filled with medium-sized, deep green peas, of excellent quality. *h.* 3ft. A remarkably prolific and distinct main crop variety. Plant of robust, vigorous habit.

Maclean's Wonderful. Wrinkled Marrow. *h.* 3ft. A productive variety, with large pods; good cropper, and of excellent flavour.

Marvel (Laxton's).* Wrinkled white Marrow. Pods produced singly and in pairs, large, much curved, and pointed, containing from seven to nine large peas, which are very green. *h.* 3ft. An excellent and productive main crop variety, of fine quality.

Prodigy. Green wrinkled Marrow. Pods generally in pairs, nearly straight, extra long and broad, each containing about ten large peas, of excellent quality and flavour. *h.* about 5ft. Plant robust, vigorous, branching; said to be very productive. A fine new variety, sent out in 1886.

Stratagem (Carter's).* Wrinkled Marrow. Pods of enormous size, and sometimes upwards of 6in. in length, each containing from nine to eleven very large peas. *l.* dark green. *h.* 2ft. to 2½ft. Habit robust. One of the best dwarf, wrinkled Marrows in cultivation.

Supreme (Laxton's).* Smooth, green-seeded Marrow. Pods from 3in. to 3½in. in length, straight, with an abruptly curved point, well filled; peas large, and of fine flavour. *h.* 4ft. to 5ft. A hardy and productive second early variety. The pods swell to an unusual size in advance of the peas, which causes them to appear ready for gathering long before they really are.

Telegraph (Culverwell's).* Wrinkled Marrow. Pods very numerous, long, broad. Peas large, nine to eleven in a pod, of a fine deep green colour and excellent flavour when cooked. *h.* 5ft. to 6ft. An excellent, well-known sort, of robust habit.

Telephone (Carter's).* Wrinkled Marrow. Pods solitary or in pairs, very large and broad, each containing from eight to eleven large peas, of first-rate quality. *h.* 5ft. to 6ft. A splendid wrinkled variety, selected from CULVERWELL'S TELEGRAPH. One of the finest second early sorts.

Veitch's Perfection.* Wrinkled blue Marrow. Pods large, usually borne in pairs, straight, containing seven or eight large, compressed peas, of superior quality. *h.* 3ft. An excellent cropper; highly esteemed as being one of the best sorts.

Late Crop.

British Queen.* Wrinkled white Marrow. Pods usually in pairs, very long and nearly straight, each containing about eight very large, tender peas. *h.* about 6ft. Plant of vigorous growth and branching habit. A good late sort.

Culverwell's Giant Marrow.* Blue wrinkled Marrow. Pods immense, broad, and upwards of 7in. long, well filled with large peas, of finest quality. *h.* 5ft. to 6ft. Exceedingly productive and fine.

Pea—*continued.*

King of the Marrows. Wrinkled green Marrow. Pods generally in pairs, broad, from 2in. to 3in. long, containing from six to eight large, oblong peas. *h.* 6ft. to 6½ft. One of the very latest and tallest-growing sorts.

Maclean's Best of All. Wrinkled green Marrow. Pods produced in pairs, over 3in. long, broad, gradually narrowed at both ends. They contain from five to eight large peas in each, but are not regularly filled. *h.* about 3ft. A rather late sort, productive, and of good quality.

Ne Plus Ultra.* Wrinkled green Marrow. Pods nearly always in pairs, fine dark glaucous green, curved, narrowed towards the stalk; peas very large, from seven to nine in a pod, of first-rate quality. *h.* from 6ft. to 7ft. An abundant bearer, and one of the best late Peas in cultivation.

Omega (Laxton's).* Wrinkled green Marrow. Pods usually in pairs, long, narrow, very closely filled with from eight to ten very large, dark green peas, of excellent quality. *h.* about 2½ft. Very prolific. This might be termed a dwarf NE PLUS ULTRA.

Prizetaker Green Marrow. Smooth, green-seeded Marrow. Pods nearly 3½in. long, slightly curved, of a deep bluish-green, covered with thick bloom. Each pod contains from six to ten large peas, which become misshapen from being compressed. *h.* 4ft. to 5ft.

Sturdy (Laxton's).* Wrinkled green Marrow. Pods produced in pairs, long, nearly straight, containing from six to nine large, dark green peas, of excellent quality. *h.* about 3ft. One of the latest sorts, robust, strong growing, much branched.

EDIBLE-PODDED OR SUGAR PEAS. All the sorts of Peas that have been already noticed are grown in gardens, principally for the use of their produce in a young or green state. They are termed Shelling Peas, and the pods are of no use when once their contents are extracted, because they are lined with a hard and tough, stringy membrane, which renders them unfit for food. In the other class, now under notice, the pods are usually destitute of this stringy substance, and readily snap, like those of Kidney Beans. If prepared and cooked, when young, in a similar way to the last-named vegetable, they are considered to form an excellent dish, one which is more appreciated on the Continent than in this country. Edible-podded Peas are not much cultivated in Britain; not so extensively, perhaps, as their merits deserve. Subjoined are the names of a few sorts.

Butter Pea. Pods from 2in. to 2½in. long, produced singly, and in pairs, deeply curved; the sides are very fleshy, thick, and succulent. *h.* 3ft. to 4ft.

Dwarf Dutch. Pods often solitary, narrow, crooked, thick, and fleshy; seeds white, large, from five to seven in a pod. A very dwarf variety.

Early Dwarf Brittany.* Pods generally in pairs, about 2in. long, narrow, fleshy, quite free from membrane. *h.* about 2½ft.

Forty Days' Edible-Podded. Pods generally in pairs, straight, free from membrane; peas medium-sized, slightly compressed, white when ripe. *h.* about 4ft. A climbing variety, which produces its flowers over a long period.

Giant Sugar Pea.* Pods sometimes 6in. in length, larger than those of any variety of this class, much twisted; peas large, distinctly seen from the outside of the pod. *h.* 4ft. to 5ft. Should be used when young.

Large Crooked Sugar Pea.* Pods very large, sometimes 5in. long, broad, often crooked, free from membrane, and exceedingly tender when young. *h.* about 5ft. One of the best sorts, more extensively grown than any of the others.

FUNGI. The Fungi parasitic on Peas are chiefly two species, which resemble each other in forming whitish coatings on the leaves and other parts of the plants; but they are not difficult to distinguish, even with the unaided eye. In both, the whitish coat is formed of rows of cells, forming threads too slender to be seen distinctly, even with a lens. Both belong to the forms included under the general name of **Mildew** (which *see*); but they represent widely different groups of Fungi. *Erysiphe Martii* (Pea Mildew) is the commoner of the two. It possesses conidia of the type described under **Oidium** and also spores in asci which lie in the perithecia. The plants are, at times, wholly covered with this Fungus, and the result is stoppage of their growth, and loss of the seeds. Unfortunately, this

Pea—*continued.*

Fungus grows on many other plants also, so that it can hardly be exterminated from gardens. *Peronospora Viciæ* (Pea Mould) is more plentiful on Tares than on Peas. On both, it grows on the lower surface of the leaves; and it differs from the Pea Mildew in sending its filaments through the Pea's tissues, thus living inside the host-plant. It differs also in the reproductive processes. The conidia are of the kind described under **Peronospora**; and so also are the *resting*, or sexually mature, spores. The latter are formed within the tissues of the Peas, and serve to reproduce the Fungus in the following spring. Plants attacked by this Fungus are pierced by it in all directions, though only the branches that bear conidia are to be seen on the outer surface of the host-plant. The diseased tissues become brown, and ultimately rotten, and fall to pieces. *P. Viciæ* appears in early summer; it attacks many leguminous plants. Remedies should be directed rather to insure prevention of injury to subsequent crops than in trying to save those plants already diseased. All refuse, especially Pea stalks, and other rubbish of that nature, must be collected and burned, to prevent the diseases being transmitted by such means from the crop of one year to that of the next. The remedies recommended under **Mildew** and **Oidium** would help to check Pea Mildew (which is quite superficial in its growth), but would not be of any use for Pea Mould.

Peas, along with Beans and Vetches, are also subject to the attacks of Pea and Bean Rust (*Uromyces appendiculatus*, var. *Pisi*). Plants diseased from this cause assume a dull, rusty-brown hue, which, in bad attacks, may almost conceal the green of the leaves, but usually only modifies it more or less. This colour is due to very numerous, small, rust-coloured spots, distributed over the surface, none of them usually exceeding ⅛in. across; though, occasionally, two or more may meet, and join into one spot. Under the microscope, the spots are seen to be made up of a crowded mass of minute, egg-shaped cells, of a rusty-brown colour, each supported on a long, slender stalk. These cells are the spores of the Fungus, and ripen towards the end of summer, or in autumn. In spring, each pushes out a blunt, slender tube, on which form three or four very small sporidia; and these, if they fall on a suitable food-plant, push a tube into it. This tube branches and spreads through the tissues, and forms, in turn, new spots of spores bursting through the epidermis, or skin, of the leaf. It is believed, by some botanists, that this Fungus appears also in another form on one of the Spurges, *Euphorbia Cyparissias*. Plants attacked by Rust should be burned as soon as possible, to prevent the disease from spreading. The position of the mycelium in the tissues of the host-plants renders any direct means of destroying the Fungus hopeless, without involving the host-plant in the demolition. Such plants as favour its spread, and give it support, *e.g.*, Vetches, should be kept as far from the Pea crop as possible.

INSECT PESTS. The Pea is exposed to the attacks of not a few insects. Some of these injure the leaves and the young stems; others feed in the fruit, eating the Peas, either while young and soft, or after they have been stored in the granary, and leaving them mere hollow shells, pierced at one side with a hole. The seeds are frequently damaged by Millipedes (*see* **Myriapoda**) while they are sprouting, especially in wet seasons, and, like all garden produce, they are eaten by slugs and snails. Among their worst foes are the Pea and Bean Weevils (*see* **Sitona**), which, as beetles, gnaw the leaflets, leaving the margins notched; or the whole leaflet is more or less completely eaten away. In very bad attacks, the whole crop may be destroyed. These beetles also feed on Beans, Clover, Lucern, and other leguminous plants. The most hurtful species are the Striped Pea Weevil

Pea—*continued.*

S. lineata), and the Spotted Pea Weevil (*S. crinita*). They are about ⅛in. long, elliptical, black, covered with minute scales, which are clay-coloured, rosy-greyish, or whitish; the beak is short and stout; and the wing-covers bear ten lines of minute pits from end to end. *S. crinita* may be known by having short bristles on the wing-covers behind, and by its slightly smaller size. These insects feed during the day, but are readily overlooked, since, when alarmed, they at once fall from the plants to the earth. They begin their ravages even in March, and may be met with throughout the summer.

The larvæ of several kinds of moths are destructive to Pea-plants, as well as to other garden produce (*see* **Mamestra, Plusia,** and **Potherb Moths**). The larvæ of a small fly (*see* **Phytomyza**) burrow between the surfaces of the leaf, and make winding, white tracks, in which they change to pupæ, and thereafter into flies; but these mines can scarcely be said to weaken the plants.

The roots are liable to be eaten by larvæ that live underground (*see* **Noctua** and **Wireworms**). The young shoots and branches are occasionally smothered, or nearly so, by swarms of Green Fly (*see* **Aphides**), usually of the species *Siphonophora Pisi* and *Aphis Papaveris*.

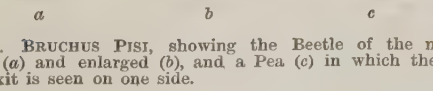
Bees, but more particularly **Humble Bees** (which *see*), at times, do considerable harm, by boring holes, from which to suck the honey, without effecting the fertilisation of the ovules by transferring pollen from flower to flower.

The larvæ of a tiny midge (*Cecidomyia Pisi*) may, at times, be found feeding, in large numbers, in the young pods, eating the unripe Peas, and causing the pods to be spotted with yellow. The larvæ are white, and reach about ⅛in. in length. They bore out of the pods, when full-fed, fall to the ground, and become pupæ in the earth.

The larvæ of certain beetles, and of two or three moths, feed on the seeds in pods approaching ripeness, as well as in dried Peas. The more noteworthy are: *Tychius quinque-punctatus* and *Bruchus Pisi* and *B. granarius* among beetles; and *Grapholitha pisana*, Guen. (*Endopisa proximana* of Stainton's "Manual"), and, to a less extent, *Endopisa nigricana* (of the same "Manual") among the moths.

Tychius quinque-punctatus is a Weevil about ⅛in. long, elongate-ovate; the beak tapers from base to tip, is rather long, and curves downwards; the colour is black, covered with coppery-red scales. The lower surface is pure white; the thorax is rounded, the thighs rather thick, toothed, and black; the rest of the legs, and the antennæ, dull red. The beetles appear in late autumn, live through the winter, and in spring and early summer lay eggs in the young pods of various *Leguminosæ*. The larvæ feed in the pods. They are yellowish-white and smooth. When full-fed, they fall to the ground, and become pupæ in the soil.

The *Bruchidæ* differ from Weevils in having the beak short, broad, and flattened, the antennæ straight and gradually becoming thicker, the wing-cases shorter than the abdomen, and the hind legs long and strong. *B. Pisi*



a *b* *c*

FIG. 42. BRUCHUS PISI, showing the Beetle of the natural size (*a*) and enlarged (*b*), and a Pea (*c*) in which the hole of exit is seen on one side.

(see Fig. 42) is about ¼in. long, oval, black, with a dense coat of silky hairs, which are bright brown above, paler beneath; thorax variegated with orange hairs; lateral

Pea—*continued.*

teeth white; wing-cases striated, with some paler spots and obscure streaks; tarsi and tibiæ, in parts, and four basal joints of antennæ dull red. This beetle has been most injurious in Southern Europe. It is believed to be a native of North America. Though often imported with Peas, it has not fully established itself anywhere in Britain. The beetles pair while the Peas are in flower; and the females deposit their eggs in the Peas, in which the larvæ live all winter, hollowing them out; finally becoming perfect beetles, and boring out from them in the ensuing spring and summer. *B. granarius* is slightly smaller than *B. Pisi*, but is otherwise much like that species, though with a thinner coat of hair. The teeth on the sides of the thorax are less distinct; and there are white dots on the back. The wing-cases are sprinkled with whitish hairs, and there is a brown stripe near the base of the wing-cases. The first pair of legs, and the four basal joints of the antennæ, are pale red; and the second and third pairs of legs are dark throughout. *B. granarius* is common in Peas, and also in pods of Beans, Broom, Furze, and Vetches. In habits, it is much like *B. Pisi*. It has been asserted that Peas and Beans containing the larvæ injure the health of persons, and of domestic animals, who partake of them.

The moths hurtful, in the larval state, to Peas are included in the great group of **Tortricina** (which *see*), and are now referred to the genus *Grapholitha*, though Stainton, in his "Manual," includes them in the genus *Endopisa*. Of these, the most common is the Pea Moth (*G. pisana*, Guen. = *Endopisa proximana* of Stainton's "Manual"). This insect measures about ½in. across the front wings, which are olive-brown in colour, with a row of short, pale yellowish lines along the front margin, directed backwards. Near the hind margin is a silvery ring, inclosing a spot in which are three or four short, black lines. The moths fly in June; they lay eggs on the young pods, and the larvæ bore into the pods to reach the seeds. When full-fed, they are about ½in. long, rather stout, and yellowish, with a black head, and brown dots on the rings. They eat their way out of the seeds when full-fed, and creep underground to become pupæ. The moths appear in the following June. Nearly allied to this species is another, *G. tenebrosana*, Dp. (*E. nigricana* of Stainton), which differs in its darker brown ground-colour, and only faintly yellowish tip; in its whitish and pale yellow scales, scattered over the wings; and in the spot near the hind margin being very little yellower than the rest, and inclosing mere dots instead of streaks. The larva of this species also feeds in Peas.

Remedies. These differ with the habits of the various insects, and other foes. For measures to get rid of Millipedes, *see* **Millipedes** and **Myriapoda**; and *see also* **Slugs** and **Snails** for remedies against the attacks of those creatures.

The Pea Weevils (*Sitona lineata* and *S. crinita*) may be best prevented from doing serious damage by using all means to promote the rapid growth of the plants, as they are thus protected against the loss of all their leaves. Good soil, well prepared and well manured, is one of the best means for obtaining a good crop of Peas. A dressing of coal ashes along the rows also favours growth. It is recommended that Peas should follow Cabbages or root-crops. All kinds of shelter for the beetles should be abolished. To free the plants when attacked, a dressing of lime, or of soot, sprinkled on the wet plants, has proved useful; and gas-lime, or sand mixed with paraffin, scattered on the soil along the rows, would probably help considerably. Harrowing, or hoeing the Peas when wet, is also said to be of marked benefit. Shaking the plants over tarred canvas, or over sheets, from which the beetles can be swept up

Pea—*continued.*

and destroyed, will materially help in reducing their numbers. For means of preventing ravages of root-feeding larvæ, *see* **Noctua** and **Wireworms.**

The mining larvæ of the fly *Phytomyza* do so little harm, that, as a rule, it is unnecessary to take means against them; the only method of cure seems to be crushing the larvæ, while in the leaves, between the finger and thumb. For means to be employed against the larvæ of the larger moths, *see* **Mamestra** and **Potherb Moths.**

If Aphides appear on the young shoots, the best treatment is to nip these off at once and burn them, and thus prevent the Aphides from increasing and spreading to the remaining parts of the plants. To free a few plants from Green Fly, dressings of soot on the wet plants, or of soap-suds, would be advantageous.

Humble Bees are seldom so hurtful to Pea flowers as to render their destruction needful, more especially since they do good by effecting, or, at least, aiding in securing the advantages of, cross-fertilisation. If it should become desirable to reduce their numbers in any garden, this can only be done by catching the individual bees, and by seeking out and destroying their nests, hidden in holes, under moss, &c.

The Pea Midge (*Cecidomyia Pisi*) seldom does much evident harm; the only methods of limiting its ravages are: Picking the diseased, yellow-spotted pods, and digging down the surface soil to destroy the pupæ.

Against all the larvæ that feed in the seeds, the most useful remedy is to expose the latter for a time to a heat of about 125deg. Fahr. This heat will destroy the larvæ, but will not injure the seeds.

Pea-straw should be removed and burned as early in the autumn as possible. Since the beetles and moths alike burrow into the ground to become pupæ, whatever may help to destroy the pupæ in the earth will be of service. Trenching the soil is of special value, since it throws many of the pupæ too deep to allow the insects to reach the surface, and other pupæ are exposed to the eyes of birds. Applications to the plants of soot, or of any other disagreeable substances, might prevent the female insects from laying their eggs thereon.

PEA, SCURFY. *See* **Psoralea.**

PEACH (*Persica vulgaris*). The Peach has been cultivated in this country since the middle of the sixteenth century, about which time it is said to have been introduced. Although generally stated to be a native of Persia, De Candolle considers the Peach to be of Chinese origin, this question being very fully treated in that author's "Geographie Botanique" and "L'Origine des Plantes Cultivées." It was known to Theophrastus in 322 B.C. Its cultivation is now more or less extensively practised over a large portion of Europe and America. In this country, the trees require protection of some sort, particularly during the spring. This is provided by planting them under glass, or against walls outside, with a southern exposure, temporary coverings being used in the latter case, throughout the flowering period, and until the fruits are set. Trees planted in the open ground never become sufficiently ripened to bear fruit: consequently, their culture is seldom attempted, except in a young state, without proper protection being provided. Peaches are grown in abundance throughout the warmer parts of Asia, and also in many provinces of the United States. In France, their cultivation receives considerable attention, and the fruits obtained are of excellent quality. Peach culture in this country, particularly forcing under glass, forms one of the most important of gardening operations amongst fruit-trees; and the success or failure of this work are matters depending very considerably on details of management, which require to be thoroughly understood. The fruit of the Peach is, more or less,

Peach—*continued.*

round, and is characterised by having a delicate, downy skin, with a furrow or suture on one side, proceeding from the stem to the apex, and varying in depth in different sorts. When properly ripened, it is highly valued, and deservedly accorded a prominent position, both amongst dessert and exhibition fruits. For propagation, general cultivation, forcing, and other remarks respecting Peach-trees and their management, *see* **Nectarine.**

Sorts. Subjoined is a selection of the best and most esteemed Peaches, all of which are worthy of cultivation, where there is sufficient accommodation, and a supply is required over a lengthened period each year. It will be observed that many of the varieties described were raised at, or have emanated from, the Sawbridgeworth Nursery. The new varieties raised at Sawbridgeworth are chiefly the result of Mr. Rivers' experiments in hybridising and raising such quantities of Peaches and Nectarines from seed. The pollen of the Stanwick Nectarine was used, and the stain of blood is very evident in the Nectarines, which are entirely changed in character. The experiments were commenced many years ago, and several most valuable acquisitions to varieties of hardy fruits have, as a consequence, been secured.

À Bec. Flowers large. Fruit large, of uneven outline, terminated with a prominent nipple at the apex; skin yellowish, dark crimson next the sun; flesh white, tender, and melting. End of August. Glands round. A fine variety.

Acton Scot. Flowers large. Fruit medium, nearly round; skin deep red next the sun; flesh pale yellow, melting, and rich. End of August. Leaves crenate; glands round. A rather small-fruited, but excellent, free-bearing sort.

Albatross. Flowers large. Fruit very large, round; skin pale yellow, mottled and streaked with dark crimson; flesh white, rich, and good. Middle of September. Leaves glandless. A fine late Peach, raised by Mr. Rivers.

Alexander. Flowers large. Fruit large, round, of a brilliant colour where exposed to the sun; flesh yellowish-white, juicy, and brisk in flavour. Early in July, in an orchard-house. Glands round. An excellent and very early Peach, of American origin, introduced by Mr. Rivers.

Alexandra Noblesse. Flowers large. Fruit very large, round; skin downy, very pale; flesh white, melting, richly flavoured. Middle of August. Leaves smooth; glands round. A very fine Peach, raised by Mr. Rivers from NOBLESSE; in consequence of its smooth leaves, it is considered less liable than its parent to be attacked by mildew.

Barrington. Flowers bright red, large. Fruit large, somewhat elongated, with a prominent nipple; skin downy, deep red next the sun; flesh whitish-green, tinged with red near the stone, of excellent flavour. Middle and end of September, succeeding ROYAL GEORGE and NOBLESSE. Glands round. The tree is a vigorous grower, and, generally, a good bearer.

Belle Bauce. Flowers pink, large. Fruit large, somewhat depressed or flattened at the summit; skin downy, deep red nearly all over; flesh white, tinged red near the stone, juicy and rich. Middle of September, or ten days later than GROSSE MIGNONNE, of which it is considered but a variety or form. Leaves crenated; glands round. A handsome Peach.

Belle de Doué. Flowers small. Fruit large, deep red nearly all over; flesh melting, very richly flavoured. End of August and beginning of September. Glands round.

Bellegarde. Flowers deep rose, small. Fruit large, somewhat inconstant obovoid, or nearly spherical, with very small nipple and distinct suture; skin excessively downy, violet-red on the shady side, blackish-purple where exposed; flesh yellowish-white, red near the stone, melting and juicy, delicately perfumed. End of August and beginning of September. Leaves large, finely serrated with round glands. This excellent sort is accepted by English pomologists as identical with the GALANDE of the French. The BELLEGARDE of the French pomologists is a different sort with large flowers, and of no special merit in this country. SYNS. English Galande, French Galande, Galande, Noir de Montreuil.

Chancellor. Flowers small. Fruit large, roundish-oval; skin dark crimson, pale greenish-yellow on the shaded side; flesh pale yellow, deeply rayed with red at the stone, juicy and rich. Middle of September. Glands reniform or kidney-shaped.

Condor. Flowers large. Glands reniform. A comparatively new very fine sort, raised by Mr. Rivers, and described as follows: "A large Peach from EARLY SILVER; colour bright crimson, flavour piquant and rich. August."

Crimson Galande. Flowers small. Fruit medium or large, roundish, deep crimson, almost black; flesh deeply stained with

Peach—*continued.*

red near the stone, tender, melting, and richly flavoured. Middle and end of August. Glands round. A hardy and prolific variety, raised by Mr. Rivers.

Desse Tardive. Flowers small. Fruit large, round, of a pale colour, slight red next the sun; flesh greenish-white, sweet and rich. End of September and beginning of October. Glands round. One of the best late Peaches.

Dr. Hogg. Flowers large. Fruit very large, round, pale yellow, tinged with crimson next the sun, and similarly dotted on the shaded side; flesh firm, yellowish-white, red at the stone, rich and sugary. Middle of August. Glands kidney-shaped. A remarkably vigorous-growing variety, which bears freely, but is not adapted for forcing; raised by Mr. Rivers.

Dymond. Flowers large. Fruit very large, flattened at the summit, mottled red on the exposed side; flesh white, stained red near the stone, highly flavoured. Middle of September. Leaves glandless.

Early Beatrice. Flowers large. Fruit medium, round; skin marbled, very highly-coloured where exposed; flesh nearly white, melting, juicy, and richly flavoured. Early in July, in an orchard-house, and outside at the end of that month. Glands small, kidney-shaped. One of the earliest sorts known; raised by Mr. Rivers.

Early Rivers. Flowers large. Fruit large, pale yellow, with delicate, flesh-coloured dots on the exposed side; flesh pale, melting, remarkably rich and juicy. Middle of July, in an orchard-house. Glands kidney-shaped. A valuable, very early Peach; it was raised by Mr. Rivers, who states that it is apt to crack at the stone, when the fruit ceases to swell, and has no flavour. To obviate this cracking, he recommends that it should be fertilised with pollen from other flowers, as it is possible the immaturity arises from insufficient impregnation.

Early Silver. Flowers large. Fruit very large and pale, with blush cheek next the sun; flesh white, melting, and rich. Middle of August. Glands kidney-shaped. Requires a warm position and favoured situation. Raised by Mr. Rivers from seed of the WHITE Nectarine, the flavour of which it partially retains.

Exquisite. Flowers small. Fruit very large, deep yellow, with dark crimson cheek; flesh yellow, stained with deep red at the stone, rich, and melting. Middle of September. Glands round. A fine-flavoured American sort, of immense size.

Golden Eagle. Flowers small. Fruit very large, round, depressed, orange-colour, with some red on the exposed side; flesh stained red near the stone, tender, rich, and melting. End of September or early in October. Glands kidney-shaped. One of the best yellow Peaches; raised by Mr. Rivers.

Goshawk. Flowers large. Beginning of September. Leaves serrate, glandless. A very large, pale-coloured, mid-season Peach, raised from an American sort, named COOLEDGE'S FAVOURITE; it is of excellent quality.

Grosse Mignonne. Flowers deep red, large. Fruit large, somewhat hollowed at the summit, and furnished with a deep suture, which appears to divide it into two parts; skin downy, pale yellow, mottled with red, dark red next the sun; flesh pale yellow, red near the stone, juicy, rich, and highly flavoured; stone small, rough. End of August and beginning of September. Glands round. This splendid mid-season Peach is one of the best in cultivation, either for forcing or for any purpose, if only one sort were required. It has been grown for a very long period, and twenty or more varieties, sent out at various times as being new, have eventually been found to be identical with it. This may be accounted for to a great extent from its being one of the most highly-esteemed sorts, and from the fact that it reproduces itself from seed.

Hale's Early. Flowers large. Fruit medium, round, depressed at the summit; skin dark crimson, particularly next the sun; flesh yellow, melting, and very good. End of July or beginning of August. Glands round. A first-rate, very early Peach, of American origin; well adapted for forcing.

Late Admirable. Flowers pale red, small. Fruit very large, somewhat oblong, with swollen nipple at the apex; skin downy, dull crimson, striped, deeper crimson next the sun; flesh yellowish-green, red near the stone, very juicy, of delicate flavour. Middle or end of September. Glands round. One of the best late Peaches, particularly under glass.

Noblesse. Flowers large. Fruit large, sometimes rather pointed, sometimes depressed, yellowish-green on the shaded side, delicately marbled, and streaked with red on the side next the sun; flesh white almost throughout, melting, exceedingly juicy and rich. End of August and beginning of September. Leaves glandless. A most valuable variety, which may be successfully forced, but the tree is sometimes subject to mildew.

Princess of Wales. Flowers very large. Fruit very large, rounded, terminated by a prominent nipple; skin cream-coloured when ripe, with rosy cheek; flesh yellowish, red at the stone, of excellent quality. End of September and beginning of October. Glands round. A very valuable late Peach, raised by Mr. Rivers from a Clingstone variety, named PAVIE DE POMPONE, worthless in this country.

Peach—*continued.*

Rivers' Early York. Flowers large. Fruit medium, marbled with red on the shady side, deep red where exposed; flesh greenish-white, melting, and richly flavoured. Beginning and middle of August. Leaves smooth; glands round. A variety raised by Mr. Rivers from the old EARLY YORK, on which it is an improvement, inasmuch as the tree escapes mildew much better, and generally produces a good crop. It is well adapted for forcing.

Royal George. Flowers dull red, small. Fruit large, globular; skin downy, deep red next the sun, dotted on the shaded part; flesh yellowish-white, red near the stone, juicy, rich, and excellent. End of August and beginning of September. Leaves glandless. One of the best-known and most highly-esteemed sorts. It forces well, but the tree is subject to mildew.

Sea Eagle. Flowers large. Fruit very large, round, lemon-yellow, deep red on the exposed side; flesh white, stained red near the stone, highly flavoured. End of September. Glands round. One of the best late Peaches; raised by Mr. Rivers from the variety named EARLY SILVER.

Stirling Castle. Flowers small. Fruit medium, roundish, pale-coloured, marbled red where exposed; flesh white, melting, and rich. Beginning of September. Leaves glandless. A hardy sort.

The Nectarine Peach. Flowers large. Fruit very large, pointed; skin nearly smooth, like a Nectarine, yellow, mottled red on the exposed side; flesh brisk and richly flavoured. Middle and end of September. Glands small, kidney-shaped. A first-rate late variety, raised by Mr. Rivers from a seed of a Dutch Nectarine, called LE GRAND NOIR.

Walburton Admirable. Flowers small. Fruit large, round, yellowish-green where shaded, crimson-mottled, with a darker colour where exposed; flesh yellowish-white, juicy, and rich. End of September and beginning of October. Glands round A very valuable late Peach.

FUNGI. The most noteworthy Fungus parasitic on the Peach is *Exoascus deformans*. This causes one form of Peach Curl, or Peach Blister, so called from the appearance it gives rise to in the leaves. The other form of Peach Blister is caused by Aphides, and may be recognised by the presence of those insects, and by the red colour of the diseased leaves. *E. deformans* makes its presence manifest by the appearance of the leaves, and by a pale bloom, visible chiefly on the lower surface. The microscope shows that this bloom is due to the presence, all over the leaf, of innumerable erect, slender cells, containing spores, and each supported on a shorter cell. The Cherry, the Gean, and the Plum, are also liable to suffer through attacks of this Fungus; but in these trees it gives rise to the so-called "witch-knots," or short branches arising in a crowded mass, the leaves and twigs of which show the bloom of the Fungus at certain times of the year. The leaves covered with *E. deformans* wither and fall off prematurely; and even while on the tree, they cease to be of use to the host-plant. Besides this, the tissues of the host are diseased by the Fungus, and it reappears year after year on the same branch system. The only remedy is to cut off and destroy the diseased branches and leaves.

Sphærotheca pannosa, a mildew, is of frequent occurrence on the Peach. It forms a dense, greenish coat over the parts affected, living on the outer surface of the cells of the host-plant. Flowers of sulphur, or the solution of potassium sulphide, is the most effectual cure for this disease. *See* **Mildew.**

Certain small pale spots may, at times, be observed on Peach leaves, the work of small species of Fungi, named *Cercospora Persicæ* and *C. circumscissa*. The injury done by them is too slight to call for a longer notice here.

INSECT PESTS. The Peach-tree is liable to injury from insect operations in several ways, but only those of more frequent occurrence need be specified. A small moth (*Anarsia lineatella*) destroys from two to several inches at the tips of the branches, by its larvæ boring into them, and eating the pith from them in spring and early summer; while the larvæ of an autumn brood eat into the fruits while on the trees. This insect belongs to the *Tineina* (*see* **Moths**), but is larger than the average of that group, reaching a span of nearly ⅝in. across the front wings, which are grey, with darker grey markings.

Peach—*continued.*

especially a dark lozenge-shaped mark on the front margin. All the wings are narrow, and long-fringed. This insect is found both in Europe and in North America.

A Weevil, *Otiorhynchus ligustici* (*see* **Otiorhyncus**), gnaws the leaves of the Peach, as well as of many other trees. The larvæ of several of the larger moths and butterflies also eat the leaves; but the harm done by them is seldom serious. A Sawfly (*Lyda nemoralis*), in the larval state, lives on several trees of the group of stone-fruits, and among these is the Peach; the larvæ live in colonies, but each in a separate tube, protected in the common web (*see* **Lyda**). The webs, with the inclosed larvæ, are easily removed and destroyed.

The worst insect enemies of the Peach-tree are Aphides, of which several species are found on it in Britain. The most hurtful is *Aphis Persicæ*, B. de Fonsc. (*A. Amygdali*, Buckton), since it causes the young leaves near the tips of the branches to assume a blistered appearance, to become thickened and red, and to curl up, so as to form retreats below them, in which the insects live protected. The leaves become useless to the tree, and drop off prematurely. The insects are of an ochreous or rusty-yellow colour, with dark brown or black markings covering a great part of the upper surface. *Myzus Persicæ* and *Hyalopterus Pruni* are both common on Peach-trees; but they do not give rise to the distortion of the leaves, though hurtful by covering the leaves with their skins and excretions, and weakening the trees by the food they draw from the tissues. The former species has the wingless female rosy or rusty-red, the winged female brown or almost black, and the male citron-yellow. The latter has the wingless female pale green, and the winged female yellowish-green. When *Aphis Persicæ* appears, the twigs most affected should be cut off and destroyed, with their inhabitants. For all the species, washes may be used, such as soapsuds, or a solution of 1lb. of soft soap in five gallons of water, or a solution of soft soap with tobacco. These liquids may be pumped on from a garden engine, or the infested twigs may be dipped into them; but special care must be taken to reach the insects on the under surface of the leaves.

The Peach Scale insect (*Lecanium Persicæ*) lives on the buds and branches of Peach, Plum, and various other trees. As in the allied species (*see* **Scale Insects**), the female is covered with a slightly convex, oval shield. This is brown, with a yellowish dorsal line, and two darker spots at the sides. As the eggs become matured, the shield becomes nearly hemispherical, and the legs

FIG. 43. LECANIUM PERSICÆ, showing (*a*) Leaf, with Male on it, slightly enlarged; (*b*) Male flying, much enlarged.

disappear from the lower surface. The males (see Fig. 43) are smaller than the females, have two wings, and bear two slender filaments, like tails; they are dark red-brown, with black head, and yellowish antennæ and legs.

Peach—*continued.*

For this, as for the other Scale insects, the best treatment is the use of a stiff brush, with similar solutions to those employed against **Aphides** (which *see*), or with paraffin, to remove them from the branches.

Lastly, the fruit of the Peach is, in common with the other stone-fruits, inhabited occasionally by the larva of a beetle (*Anthonomus druparum*), which feeds in the seed, but usually does not greatly check the growth of the edible part of the fruit. This beetle is nearly related to the **Apple Blossom Weevil** (which *see* for methods of prevention and remedies).

PEACH BLISTER. A blistered and curled state of the leaves, which become somewhat fleshy, and fall prematurely. It may be caused by a Fungus, *Exoascus deformans* (*see* **Peach Fungi**), or by Green Fly, of which the worst species is *Aphis Persicæ* (*see* **Peach Insects**).

PEACH MYRTLE. A common name for *Hypocalymma robustum.*

PEACOCK FLOWER. A common name of *Poinciana regia.*

PEACOCK FLOWER FENCE. A common name for *Adenanthera pavonina.*

PEA, EARTH. *See* **Lathyrus amphicarpus.**

PEA, EVERLASTING. *See* **Lathyrus sylvestris platyphyllus.**

PEA, FLAT. *See* **Platylobium.**

PEAGLE. An old name for *Primula veris.*

PEA, GLORY. *See* **Clianthus Dampieri.**

PEA MOTH (*Grapholitha pisana*). In the larval state, the Pea Moth is one of the most hurtful insects to the vegetable which it infests, and is, at the same time, very common. It is also known as *Endopisa proximana.* For a full description of this Moth, methods of extermination, &c., *see* the remarks on INSECTS under **Pea.**

PEA NUT. *See* **Arachis hypogæa.**

PEA, PARTRIDGE. *See* **Heisteria.**

PEA, PIGEON. *See* **Cajanus indicus.**

PEAR (*Pyrus communis*). The Pear-tree has been known, and has been under cultivation, from a period of remote antiquity. It is found wild in some parts of England, is a native of most temperate parts of Europe and Western Asia, and is also found in the Himalayan region; other wild types, besides *P. communis*, have had more or less to do with the origin of many cultivated Pears. In a wild state, its branches are thorny; but, under cultivation, the thorns disappear, and are replaced by fruit-buds, which are formed on shoots of about the same length, technically termed spurs. The tree is naturally more inclined to grow in a pyramidal form than the Apple-tree (*Pyrus Malus*). It differs also from the Apple in being longer as a seedling plant in coming into bearing; while, on the other hand, under favourable conditions, it is very much longer-lived. The Pear can, however, scarcely be considered so hardy as the Apple, as it is not found so far north, in either a wild or cultivated state. In old orchards, where Pear and Apple-trees have been growing under similar conditions, it has been noted that the former were in full vigour, and bearing abundantly, long after the latter had disappeared, or had been removed in consequence of natural decay. The Pear does not produce fruit on the former year's wood, but on spurs which grow out of wood not less than a year old. On the points of these, buds are formed, and the flowers are produced from each, in corymbs of from five to nine (see Fig. 44, which shows two corymbs of flowers). A large proportion of these

Pear—*continued.*

flowers will usually fall off at an early stage of growth, because of their being unable to compete with stronger ones, which take a lead, if weather and other conditions allow them to set properly. Were all the flowers to set and be allowed to come to maturity, the size and quality of fruit throughout would be materially affected. This is not of very frequent occurrence generally; but, should it take place, thinning is an obvious remedy. The uses of Pears are pretty well known. First, and most important, as dessert fruits, nearly all the best varieties are highly esteemed. For kitchen use, some few sorts are specially adapted, because of their fruits being large, and the flesh firm and somewhat austere rather than sweet; this renders them more suitable for stewing, baking, &c. Another use for Pears is that of producing perry. Fruits for this purpose may be either large or small; the more austere or rough their taste, the better is the liquor product considered.

FIG. 44. FLOWERING BRANCHLET OF PEAR.

PROPAGATION. This may be accomplished by seeds, by cuttings, by layers, and also by budding and grafting. Seeds are sown with a view to raising new varieties, and more largely for the purpose of procuring stocks, whereon to graft sorts already approved.

Seeds. Seedlings might be raised in rather large pots (about 9in.) of loamy soil, which should be covered with pieces of slate or board at the time of sowing, to prevent any depredations of mice, and placed on bricks or tiles, to stop worms from entering. If sown in autumn, and the pots are placed in a sheltered position outside, the young seedlings may be expected about March, when the coverings must be removed. Seeds sown later on will require about three months to germinate, while some may keep dormant for nearly a year. The young plants may remain in their pots one summer, and be transferred to the open ground the following autumn. Only the seeds of first-class sorts should be reserved for raising others, and they should be saved from fine fruits which have been gathered from healthy, vigorous trees. Seedling Pears seldom bear fruit before the sixth or seventh year. Seeds intended only for the purpose of raising stocks may be collected, cleaned from the pulp by washing, and afterwards sown in the open ground. Drills about 9in. apart, and 2in. deep, are suitable; the soil should be previously well pulverised and prepared. The seedlings may be transplanted when a year old, and grown on until they are large enough for grafting.

Cuttings and Layers. Propagation by cuttings is a slow process, only to be recommended for preserving a variety (that might otherwise become lost) until some

Pear—*continued.*

grafts are procurable. It is not, at all times, an easy or a certain method. Layering is practicable, if it is desired to have trees on their own roots; but there are few, if any, advantages to be derived, and, consequently, this system is not much practised.

Budding and Grafting. These are the principal methods adopted for propagating Pears; the former is practised in the months of July and August, the latter chiefly in March and April, or so soon as the sap begins to flow. Whip or tongue-grafting is the plan best suited; but, according to Baltet, side-grafting under the bark in July and August, cleft-grafting, inlaying in March and April, and crown-grafting in April and May, are also applicable. The trees may be worked as standards, or close to the ground, according to the sort of stock and the form in which it is eventually intended to train them.

Stocks. The principal stocks used for Pears are the Pear itself, either common or wildings, the Quince, and sometimes the Whitethorn. On the common Hawthorn, the Mountain Ash (*Pyrus Aucuparia*), and the Medlar (*Mespilus germanica*), the Pear may also be grafted with more or less success; but the Pear stock and Quince are the best, and are most extensively used. Pear stocks, as already indicated, are raised from seeds; those obtained from the wild or from common sorts are well adapted. Stocks from Quince are readily propagated from cuttings, taken with a heel, or, better, by means of layering. Old stools that are strong enough to produce vigorous shoots, may be covered with soil; and, during autumn, after a sufficient time has elapsed for the shoots to root, they may be detached and transplanted in the different sizes that are calculated to be ready for grafting about the same time. Layering of short Quince shoots for stocks should be practised some time during winter, and the rooted plants will be ready for removal so soon as the leaves drop in the following autumn. Whitethorn stocks are raised from seeds.

In the cultivation of Pears, the sort of stock on which the trees are worked has always a very important bearing, particularly in certain soils, on the general health, vigour, and fruitfulness of the trees after they become established. The Pear stock is, of course, the most natural, and trees grafted on it possess more vigour, and attain a greater age, than do those on any other. The roots, however, have a tendency to penetrate deeply into the subsoil, which is, in many localities, cold and unsuitable to their requirements; they are also long, and have but few small fibres: consequently, the trees do not transplant readily, unless the work is rather frequently undertaken, and the roots are kept pruned. In deep and rich land, the Pear stock is apt to induce a too luxuriant growth, which is attended with comparative unfruitfulness; but, in hot districts, and in chalky soils, this stock may be found to possess considerable advantages over any other. Grafting of seedling Pear stocks may be practised, either close to the ground, or at any desired height, as stock and scion are inclined to enlarge at about an equal rate. For standards, only stout, vigorous stocks are suitable for grafting at some height up; weak ones are, for this purpose, of little use, unless worked near the ground with a variety likely to be of sufficiently upright growth to form the requisite stem itself. Preparations for grafting should commence by cutting off scions before any signs of vegetation appear, and laying them in deeply under a north wall. The stocks should also be cut back near to where the union is intended, before the sap commences to rise.

In contrast to the Pear stock, and its method of rooting, as already referred to, stands the Quince, which offers many advantages in comparison. It encourages a dwarfer growth, and an earlier bearing habit, and the fruit is often more highly coloured and better ripened. The Quince forms numerous fibry roots within a short distance from

Pear—*continued.*

the surface, none of which are inclined to go deep; consequently, the trees may be readily and safely transplanted, even when they are several years old. This stock is specially adapted for shallow soils, for damp situations, and for planting where the subsoil is of an unfavourable description. Ripening of the wood goes on concurrently with that of the fruit, and the less vigorous growth which is encouraged has, therefore, a much better chance of becoming matured in autumn. As Quince wood does not usually enlarge so rapidly as that of the Pear, grafting should be performed as close as possible to the ground, and, after the clay is added, some soil should be brought and heaped over it. If a Quince stock were grafted with a Pear at any distance above ground, in all probability, the scion above would eventually enlarge faster, and the tree stem would be of less diameter near the ground than higher up. By working low, and keeping the Quince portion from being exposed, this may be avoided. For procuring standard trees on Quince roots, it is, therefore, best to adopt a system of double-grafting—that is, work a vigorous variety of Pear at the base, to grow and form a stem, on which any desired sort may be grafted higher up. Double-grafting proves very advantageous with many varieties of Pears, but it does not answer on all alike. On this point, Mr. Rivers, who makes the system a speciality, states: "Double-grafted Pears seem always to make healthy and prolific trees; it must not, however, be concluded that to graft a free-growing sort of Pear on the Quince and then to regraft it with the desired sort, will always answer. Some kinds require the stock belonging to their race; this can only be found out by the clever cultivator—as, for instance, the Jargonelle on the Beurré d'Amanlis, the union of which is perfect, and the trees healthy. Gansel's Bergamot, double grafted, becomes a marvel of fertility." It is especially important that Quince stocks intended for grafting should be cut back, for the purpose, very early in the year: active growth begins, in favourable weather, by February, or, at least, the sap commences to flow; and if heading back is deferred until this takes place, the upper part of the stock left will often die, and the grafts in consequence fail to unite.

CULTIVATION. *Soil and Situation.* Any fairly rich, loamy soil, of good depth, with a subsoil sufficiently well drained to prevent the possibility of stagnant water accumulating, will usually be found to suit Pear-trees. When planting, the size of garden, and the amount of wall space available for the tree in question, should be taken into consideration, as well as the character of the soil. The last-named item must, to a considerable extent, determine the sort of stock best suited—namely, whether it shall be the Pear or the Quince. On the first-named stock, the trees will prove more vigorous, and will require a greater depth of soil; the result frequently being that a much longer period must elapse before they arrive at a bearing state. Where space is limited, and the soil shallow, trees on the Quince stock should have preference over others. It is important to remember that the roots of a tree worked on Quince are concentrated very close to the base, and are situated very near the surface. They require, because of this, more frequent attention by way of replenishing part of the soil around them, and by the application, at least annually, of a thick mulching of good manure, which tends to preserve moisture as well as to afford nutriment. Some sorts of Pears, worked on Quince, have a tendency, in a favourable season, to bear an unduly heavy crop, which, if allowed, would be likely to check the new growth and bring the tree to a stunted and unfruitful state. This must be avoided, by thinning the fruit under such circumstances, when in a young state, or by giving special attention to supplying sufficient nourishment throughout the bearing season, for perfecting the crop, without risking the proper maturation of wood

Pear—*continued.*

for the following year. Although the Pear will often succeed in a rather strong, loamy soil, it will not do so on heavy clay, unless previously well drained, trenched, and allowed to become pulverised. To encourage a start in young trees, where the soil is somewhat unfavourable or poor, a compost of turfy loam, decayed manure, and old potting soil, if procurable, should be mixed and applied above the roots, after they are merely covered with soil from which manure is excluded. It is of importance that the roots be carefully and evenly spread out in planting. Regarding the various situations in which Pears succeed, much depends on the different localities and the sorts grown. Even where good sorts are found to succeed fairly well in the open garden, their fruits are invariably much improved in quality if some trees are favoured with a position against a wall. Wall space is usually limited, yet it is questionable if it could be more profitably occupied than by good sorts of Pears—at least, in gardens where the fruit is much valued, and where samples from the open rarely attain a state approaching perfection. A south aspect is that recommended for really good dessert sorts; many will also do well on walls, with either an eastern or a western exposure. The frequent failure of the Pear crop may principally be attributed to the extremely precarious weather so generally experienced in spring, when the trees are in blossom, and also for a time afterwards, when young fruits should be continuing to make progress in swelling off. Trees against walls may then be more readily protected with temporary coverings of some sort than others fully exposed; the wall, moreover, is of material help in itself, affording shelter particularly if some coping boards are fixed near the top, somewhat like those in frequent use over Peach-trees.

Systems of Training. There are numerous systems of training Pear-trees, according to the purpose for which the trees are required, and the position they are intended to occupy. For the open garden, standard and bush trees, pyramids, espaliers, and cordons are each and all available; for walls, the modes of training usually adopted are the horizontal, the fan, and double or triple cordons, trained in either an upright or an oblique direction. Dwarf lateral cordons, with stems about 1ft. high, and two branches trained in opposite directions, are suitable for planting in sunny positions alongside walks, where they occupy but little space, and usually succeed on warm, rather light soils. Espalier training has long been popular for the open ground. It admits of trees being planted within about 2ft. of the edge of a walk, and the ground may be cropped to within a short distance of their base. An espalier fence on which to train Pear-trees may be formed by straining horizontal wires 1ft. apart, on a framework about 6ft. high. This would admit of a tree being trained with an upright stem and six horizontal branches on either side. If several espalier trees were permanently planted in a continous line, a space of from 16ft. to 20ft. should be allowed between each two; cordon or other trees might be grown in this space, with a view to their being removed before the other branches meet. Espalier fences are more frequently formed of wooden rails, or stout upright stakes, than of wires, on account of the expense incurred in erecting the latter, and the objection usually taken to their appearance when fixed. This arrangement is also preferable where only a few espaliers are grown and where the trees are widely disposed. The pointed ends of stakes so used should first be charred or dipped in hot creosote. Espalier training has many advantages over other systems. It admits of all the branches being well exposed to light on both sides, and easy facilities are also afforded for regulating them, so as to equalise the flow of sap. The fruits on such trees are usually not much injured by rough winds, and it is a comparatively easy matter to protect the blossoms in spring. Besides

Pear—*continued.*

horizontally-trained trees, the five-branched vertical, and single cordons, may be grown on strained wire fences, in which position, if some slight protection is afforded the trees when in flower, good results may be obtained.

Standard Pears are mostly worked on the Pear stock. This form of tree is not much planted in kitchen gardens, but is most frequently seen in paddocks, orchards, &c., and is still more extensively adopted for market gardens, where the ground beneath is cropped with bush fruits, &c. When once properly started, standard trees grow rapidly, and soon arrive at a bearing state. They may be planted in rows at about 30ft. apart, and 25ft. distant in the rows; or more space may be allowed according to circumstances.

Bush Pear-trees on the Quince stock are usually very productive, and, when laden with fruit, are exceedingly ornamental. They are specially adapted for small gardens, and may be planted as close as 4ft. or 6ft. Bush trees may readily be kept at a height not exceeding the latter figure, and eventually induced to grow nearly as much in diameter. When they are in full bearing, it is necessary to apply a good top-dressing of manure.

Pyramid training is largely practised with Pear-trees, and handsome specimens, some 15ft. high, are sometimes to be seen. Such trees, when once formed, invariably flower profusely, and, if the weather and season prove favourable, are very productive. Pyramids may be procured worked either on the Pear stock or on the Quince. On the Pear stock, and in good deep soil, 8ft. to 10ft. apart may be allowed in large gardens; for the Quince, 6ft. between will generally prove sufficient, particularly if space is limited.

Single, double, or triple cordons soon effectively furnish walls and afford opportunities for growing those varieties that are known to succeed, and for trying any reputed good sorts from other localities. The trees may be trained vertically or obliquely; for high walls, the first-named plan may be adopted, while an oblique angle would allow a further extension on a low wall. They may have been worked on either Pear or Quince stocks, according to which succeeds best; and, in planting, provision should be made for allowing a space of from 1ft. to 1½ft. between each two of the cordon branches. The different sorts of cordon will, therefore, cause a variation in the distances apart to be allowed when planting.

Pear—*continued.*

Horizontal training is the system perhaps most generally adopted for Pear-trees on walls; that is, an upright stem is secured, with branches proceeding horizontally in either direction. If grafted on the Quince, these trees should not be situated much wider apart than 12ft.; otherwise, the branches from each will not extend sufficiently far to properly occupy the intervening space. On the Pear stock, they may be planted about 20ft. apart. Walls being so expensive to build, and so valuable for the cultivation of fruit-trees, it is most important that their surfaces should be covered with branches as quickly as possible. The branches on trees horizontally trained require to be about 1ft. apart, and, as generally only one pair can be obtained each year, the system for wall-covering is rather a slow one. To utilise the intervening space between permanent trees, riders may be planted midway, and trained as well as circumstances admit, something in the way suggested at B, Fig. 45, where A, A represent the permanent trees. Such temporary trees for fruit-production are not much to be depended upon, as they have to be cut away when the others require space, and this is, perhaps, just at the time they arrive at a bearing state. One of the chief essentials with horizontal trees is to keep their lower branches equally vigorous with the more favourably-placed upper ones. To effect this, it is frequently necessary to raise the former in an oblique direction, while the latter are kept horizontal, until of about an equal strength, when they may all be trained horizontally. In order to furnish the angle between two permanent trees trained under this system, the upper pair of branches of a rider would of necessity have an undue advantage over the others below, as shown in the illustration to which reference

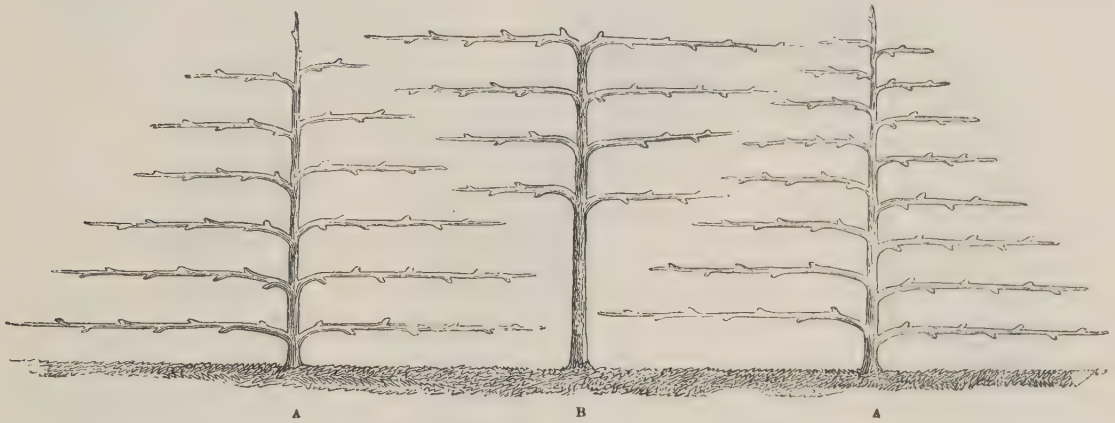


FIG. 45. HORIZONTAL SYSTEM OF TRAINING PEAR-TREES.

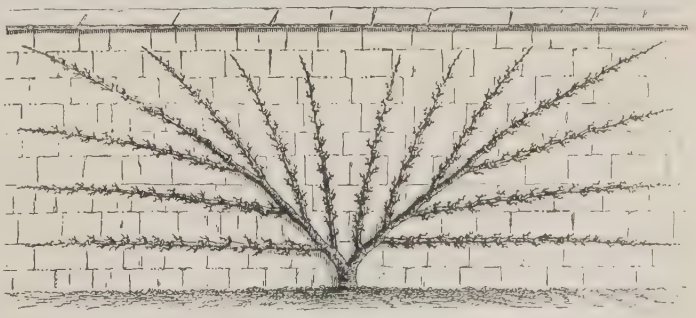


FIG. 46. FAN-TRAINING OF PEAR-TREES.

Pear—*continued.*

has been made. This would be unavoidable, and a mere furnishing of the wall would be the chief result, with what fruit the untoward circumstances allowed.

Fan-training of Pears (represented in Fig. 46) is better adapted for walls that are much higher than those usually surrounding gardens, as, by it, the upper portions may be far more quickly reached and covered, than by the horizontal system. Fan-trained trees are not so easily managed in a young state as those grown on either of the other methods for furnishing walls to which reference has been made. When once established, they frequently, though not always, bear fruit of good quality, particularly near the tops of the branches. Since cordons have become more extensively cultivated, fan-trained trees have, to a great extent, been displaced.

Pear-tree Arbours. For covering a portion, or the whole, of a main, central, or other walk in a garden with Pear-

FIG. 47. PEAR-TREE ARBOUR.

trees, a plan such as that represented in Fig. 47 might be adopted. For training such trees, a curved iron bar would be best for forming the span, and affording the necessary support; trees on rider stocks, either on the Pear or double-grafted, being planted opposite each other, and trained in the way shown by the engraving. The centre of the span should be from 7ft. to 10ft. above the walk, according to the proportionate width of the latter. By summer pinching, such trees might be kept restricted without much pruning in winter, and only sufficient space for insuring the full admission of light and sunshine need be allowed between them when planting.

Pruning. Standard Pear-trees require but little attention in pruning, except in thinning out when it becomes necessary, and in shortening or removing irregular or weak growths. If allowed to grow naturally and somewhat erect, they soon form good heads, and commence bearing. Young standards may be cut back, after being

Pear—*continued.*

planted, to within about 6in. of where the grafts were inserted; and, if six main branches can be formed, they will be found sufficient, and should be allowed to extend. If bush trees are not allowed to form a central shoot, material assistance will be given in strengthening all the branches; these should not be shortened until the desired size of tree is obtained, and their limit is reached. Bush-shaped trees, grafted on Quince stocks, are never inclined to produce strong wood, especially when in full bearing, and are very easily managed. In form, established pyramids require to have an upright stem, and each main branch, from the top downward, should be shorter, horizontally, than the one immediately below it. To establish and train large pyramids with an even outline, requires considerable experience in pruning, and a great deal of attention to keep the main side branches regulated and the flow of sap evenly distributed. All the laterals formed in and about the centre must be pinched or otherwise removed in summer, in order that the branches and their foliage may receive the amount of sun and air which they require. Pyramids are specially inclined to form a mass of shoots if this is not attended to, and success with trees thus trained depends greatly on the proper and timely execution of summer pruning. Most sorts of Pears are naturally inclined to form a semi-pyramidal habit of themselves; and where the necessity of preserving an even outline is unimportant, the trees may be allowed to grow almost naturally, after being started as pyramids at a nursery. Horizontal and espalier-trained trees require pruning somewhat similar to each other. Young trees should be encouraged to grow strongly, by allowing their shoots to proceed without being shortened. During the latter part of summer, all lateral growths should be pinched or cut back to about five joints, beginning with the upper branches, and, after a few days' interval, doing those lower down. This will allow of the free admission of light and air, to assist in the formation of fruit spurs, and additional sap will also be diverted to the whole of the branches left. Cordons of any shape should also be allowed to grow without any shortening whatever being practised on the leading growths when once they are fairly well started, and are of about equal strength. Mr. Rivers' system of pruning cordons, which he has frequently proved, and justly considers very simple, is as follows: "In June, stop the more robust shoots to four or five buds, leaving the well-balanced shoots untouched; in September, when the fruit has attained its proper size and colour, prune all the shoots down to three eyes. Under this system, the cordons look rather straggling and untidy during the summer, but neat enough in the autumn and winter. I believe that, by the exercise of moderation in pinching, the growth is more equally distributed; at all events, my cordons, whether single, double, upright, five-branched, or lateral, have produced an abundant crop of fine fruit, and I can recommend the system as perfectly sound."

Spur-pruning consists in shortening back and reducing

Pear—*continued.*

the number of spurs, when they are too numerous, or project too far from the branch. A spur is a short side branch, which either has proper blossom-buds at its apex, or only imperfectly-formed buds that elongate but slowly, compared with ordinary wood-producing shoots. It has already been stated that the fruit of the Pear is borne on spurs. The system or mode of bearing is

FIG. 48. FRUITING BRANCHLET OF PEAR.

shown in Fig. 48 It frequently happens that a tree has very numerous spurs, but only a few that are set with blossom-buds. The other slender ones produce leaves only, and, when they become numerous, it is more likely that they will, if allowed, still further increase, rather than diminish, as time goes on. To prevent this, and encourage the formation of more blossom-buds, such spurs should be thinned in winter, and cut back nearly close on the upper branches, at the same time thinning and shortening somewhat less severely those on the middle and lower branches respectively. This tends to cause the sap to be more evenly distributed over all parts of the tree, which further conduces to change numerous barren spurs into fruitful ones.

Root-pruning has a wonderful influence on Pear-trees worked on the Pear stock, when they become unfruitful from over-luxuriance, or because of their roots having entered a cold and unfavourable sub-soil. The Quince, being of weaker growth, curtails the supply of sap, which thus restricts the undue vigour of shoots, and causes a more generally fruitful habit. Hence, trees worked on it do not require root-pruning so frequently to insure fertility, as do those on the Pear. If trees requiring root-pruning are not too old, they should be lifted early in autumn, and their large roots cut back, while all others must be carefully preserved. All cuts should be finally sloped on the upper part of roots, leaving that beneath intact; this tends to keep the small new ones, when formed, near the surface, instead of encouraging them to proceed downwards. Root-pruning of large trees may be effectually performed by digging a trench round them, and shortening back the mains, to within, say, 3ft. or 4ft. of the base. The first year after this has been practised, the trees will not be likely to bear much fruit—indeed, the necessity of such an operation suggests that the wood is not in a proper fruitful condition—

Pear—*continued.*

but, in the following winter, the results will invariably be apparent by the presence of numerous spurs, furnished with properly-developed blossom-buds.

Gathering and Storing. Some few sorts of Pears require gathering at a particular time: otherwise, the fruits never acquire their proper flavour. The well-known Williams' Bon Chrêtien, for instance, becomes musky if allowed to hang too long, while it is juicy and excellent if gathered early enough. As a rule, most of the varieties are ready so soon as their fruits, on being lifted to a horizontal position, part readily from the spur. Many of the early sorts require gathering before they are so far advanced; others, ripening in succession, must be frequently examined, and gathered at the time experience suggests. Fine specimens should be laid on a little moss, in shallow baskets, and carried to the fruit-room, where they should be placed in single layers, on shelves. A cool, steady temperature is best suited for preserving fruit, and the atmosphere should be kept dry. To maintain a supply of ripe Pears, it is frequently necessary to adopt some method for hastening the ripening process, with a variety usually coming into proper condition at a later date, to supply a deficiency, maybe, a month previous. This may be successfully accomplished by packing some fruits in soft material, such as cotton wool or dry fern, and placing them in a warm cupboard, or drawer, not far from a fire. In winter, almost any late variety may be improved in flavour, as well as forwarded in ripening, by this simple process.

Pear-trees in Pots. This interesting method of culture is almost certain to succeed if only due attention is given to watering, and also feeding, after the fruits commence swelling. Mere protection from frost in any unheated glass house is all that is necessary in spring. About the beginning of June, the pots may be plunged in some prepared soil outside, into which the roots may be allowed to enter for the summer; in autumn, when repotting should be attended to, they may be cut off. For this system of culture, trees on the Quince are best adapted. They are often inclined to produce more flowers than could possibly be matured; in such instances, a large number of the weaker ones should be removed before expanding. For other remarks respecting fruit-tree culture in pots, *see* **Orchard House.**

SORTS. Varieties of Pears are extremely numerous, a large proportion of them being worthless, and unfit for any purpose whatever. It is, therefore, extremely important that reference should be given only to sorts that are worthy of cultivation: this aim has been kept in view in the preparation of the following list. It includes the varieties, with some additions, recommended as being worthy of cultivation, in an abridged statement, taken from the full Report of the Executive Committee of the National Pear Conference, held in the Royal Horticultural Society's Gardens, Chiswick, from 21st October to 4th November, 1885. This interim report was prepared by Mr. A. F. Barron, secretary to the committee, and published in the horticultural press during December of the same year. At the Pear Conference referred to, contributions were received from thirty-five of the English counties, also from Scotland, Ireland, Wales, and the Channel Islands. In addition, several large and meritorious collections were received from France. The report in question states that, "without entering into comparison of the merits of the different collections exhibited, it is important to notify this fact, that the cultivation of good Pears is not confined to any particular climate or district of the country." To confirm this, reference is made to noteworthy exhibits from Jersey, Kent, Hampshire, Sussex, Cheshire, and also from Scotland. The subjoined is added: "Nothing contributes so much to these successful results as good and careful cultivation. As a general rule, the best fruits

Pear—*continued.*

are produced where the greatest care is bestowed. An important factor in the successful cultivation of the Pear is, as gathered from the returns, in the use of the Quince stock, which, from its close, surface-rooting character, is more directly amenable to the attention of the cultivator." A considerable portion of the subjoined descriptions of Pears is translated, briefly, from Leroy's comprehensive and reliable work, the "Dictionnaire de Pomologie," which contains, doubtless, the most exhaustive treatment of the subject that exists.

Alexandre Lambré. Fruit medium, roundish-obovate; eye small, open; skin smooth, pale yellow, with small points of russet; flesh white, melting, and sometimes very rich. A very fine November Pear, but somewhat variable.

Althorp Crassane. Fruit medium, roundish-obovate; eye rather large, open; skin pale green, slightly flushed with brown-red; flesh white, juicy, buttery, with a pleasant flavour. October and November. A first-rate sort. The tree is hardy, vigorous, and bears well.

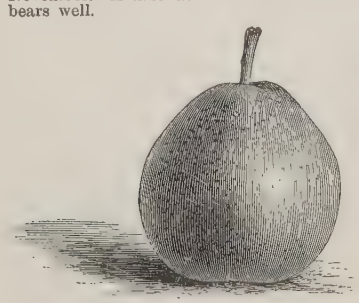


FIG. 49. PEAR AUTUMN BERGAMOT.

Autumn Bergamot. Fruit rather small, roundish, somewhat depressed; eye small, open, set in a shallow depression; skin brownish-green on shady side, reddish-brown next the sun, covered with rough, brown-russet specks; flesh whitish, tender, slightly gritty at the core, juicy and richly flavoured. October. A good and very old sort. Vigorous growing and hardy. See Fig. 49.

Baronne de Mello. Fruit rather small, pyriform, rounding towards the eye; eye small, open; skin greenish-russet, entirely covered with brown-russet; flesh greenish, juicy, buttery, and richly flavoured. October. An excellent little autumn Pear, of first quality.

FIG. 50. PEAR BEURRÉ BOSC.

Bellissime d'Hiver. Fruit large, roundish; eye large and open in a deep basin; skin deep green, shining, brightly flushed. November to April. One of the best culinary Pears.

Bergamotte Esperen. Fruit medium, roundish or Bergamot-shape; eye small and open; skin even deep green, with brown-russet dots at first, becoming greenish-yellow when ripe; flesh yellowish, melting, very juicy and pleasant. January and February. Requires a wall in late situations and wet climates.

Pear—*continued.*

Beurré Alexandre Lucas. Fruit large, handsome, obovate; skin greenish-yellow-russet, becoming yellow as it attains maturity; flesh white, juicy, melting, and good. A splendid sort, ripe in December.

Beurré Bachelier. Fruit large, irregular-obovate; eye small, closed; skin greenish-yellow, with dark russet; flesh juicy, melting, and rich. December. Handsome and good.

Beurré Berckmans. Fruit medium, pyriform; eye open, almost level with the surface; skin pale yellow, strewn with numerous dots of russet; flesh juicy, white and pleasant. November. A nice-looking and excellent Pear. The tree is a good bearer.

Beurré Bosc. Fruit medium, long-pyriform; eye open, in a shallow basin; skin yellow, covered all over with orange-russet; flesh white, melting, buttery, very rich. October and November. A handsome and excellent dessert Pear. The tree requires a wall in cold soils and situations. See Fig. 50.

Beurré Capiaumont. Fruit small, pyriform; eye large and open, level with the surface; skin yellow-russet, flushed; flesh white, melting, and richly flavoured. October. A good cropper, and very hardy.

Beurré Clairgeau. Fruit large, curved-pyriform; eye small, open; skin smooth, yellow-russet, flushed with bright red; flesh half-melting, sometimes gritty, but sweet. November. Showy and sometimes very good.

Beurré d'Amanlis. Fruit large, obovate, uneven in its outline; eye open, set almost even with the surface; skin at first of a bright green, becoming greenish-yellow flushed with brown-red; flesh tender, juicy, melting, and richly perfumed. September. One of the best early Autumn Pears.

Beurré d'Anjou. Fruit large, handsome, regular-obovate; eye small, open, set in a large and deep basin; skin greenish-yellow, with patches of russet, sometimes flushed with bright red; flesh juicy, melting, and richly flavoured. November. A very fine sort.

Beurré d'Aremberg. Fruit medium, pyriform; eye small, deeply set; skin yellow, covered with numerous regular patches of russet; flesh white, melting, very juicy, and agreeably flavoured. December and January. A good and well-known sort, and a great bearer. The tree may be grown as a standard or pyramid, but the fruit is much better from a wall.

FIG. 51. PEAR BEURRÉ STERCKMANS.

Beurré de Jonghe. Fruit medium, handsome, regular-pyriform; eye small, open; skin golden-yellow, covered with dark orange-russet; flesh greenish, melting, highly perfumed. December. An excellent sort.

Beurré de l'Assomption. Fruit very large, pyriform, bossed; eye large and open, almost level with the surface; skin lemon-yellow-russet, with large patches of russet round the eye; flesh white, juicy, melting, and rich. A most delicious Pear, ripe in the middle of August. The tree is very fertile, and succeeds well on the Quince.

Beurré Diel. Fruit large, handsome, obovate; eye large, in an uneven basin; skin greenish-yellow, with numerous patches of russet; flesh juicy, very buttery, melting, and very rich. November and December. A Pear of great excellence. The tree is hardy, very vigorous, and an abundant bearer, either as a standard or against a wall. The branches should be kept well thinned.

Beurré Giffard. Fruit medium, short-pyriform; eye closed, in a shallow basin; skin greenish-yellow, flushed; flesh white, juicy, melting, highly flavoured. August. A very good early sort.

Beurré Hardy. Fruit large, obovate; eye large, open; skin smooth, greenish-yellow, entirely covered with patches of brown-russet; flesh melting, juicy, and sweetly perfumed. October. A very delicious fruit. The tree is a strong grower and a good bearer. It forms a very handsome pyramid.

Beurré Rance. Fruit medium, pyriform; eye small, open; skin dark green, with numerous black-russety spots; flesh white,

Pear—*continued.*

melting, very juicy, sometimes richly flavoured. February and March. A late and very valuable sort for dessert, succeeding as a bush or standard, or on a west wall. It should be double-grafted. The fruit does not always ripen; but it is also good for stewing.

Beurré Six. Fruit large, bossed, pyriform; eye small, open; skin smooth, greenish-yellow, with patches of russet; flesh very juicy, melting, and good. October.

Beurré Sterckmans. Fruit medium, short-pyriform; eye open, in a slight depression; skin yellow-russet, brightly flushed; flesh white, very juicy, melting, and rich. December. A fine-looking and excellent Pear. See Fig. 51.

Beurré Superfin. Fruit large, bossed, obovate; eye very small, closed; skin greenish-yellow, covered with reddish-russet; flesh white, juicy, buttery, melting, and delicately flavoured. October. A handsome and excellent fruit. One of the best Pears in cultivation.

Bishop's Thumb. Fruit medium, long-pyriform; eye small, open, level with the surface; skin greenish-yellow, with numerous patches of russet, sometimes flushed; flesh juicy, melting, and moderately flavoured. An old favourite sort, ripe in November.

Black Pear of Worcester. Fruit large, obovate; eye small, in a deep basin; skin rough, covered with very dark russety-brown. December to March. An excellent stewing Pear.

Bouvier Bourgmeister. Fruit medium, obovate; eye small, half-open; skin pale yellow, spotted with bright russet; flesh buttery, melting, juicy, of very excellent flavour. November.

British Queen. Fruit medium, short-pyriform; eye small; skin smooth, orange-yellow, slightly flushed; flesh juicy, melting, buttery, and rich. October. Quality at times somewhat variable.

Broompark. Fruit medium, roundish; eye small; skin dull greenish-yellow; flesh melting, juicy, buttery, with a rich, musky flavour. January. An excellent winter sort. Tree very hardy, vigorous, and an excellent bearer.

Caroline Hogg. Fruit medium, roundish, or Bergamot-shape; eye open, in a large basin; skin thick, brown-russet, flushed; flesh juicy, sweet, melting, and rich. December. A dessert Pear of first quality.

Catillac. Fruit very large, roundish; eye open, in a deep basin; skin green, with numerous small points of dark russet, flushed with brownish-red. One of the best culinary Pears in use all winter.

Chaumontel. Fruit rather large, short-pyriform; eye open, in a deep basin; skin rough, greenish-yellow, flushed; flesh buttery, melting, and richly flavoured, if grown in rich and warm soil. January. This sort is much grown in Jersey and Guernsey, where it succeeds perhaps better than anywhere else.

Citron des Carmes. Fruit medium, obovate; eye small, closed; skin green at first, changing to pale yellow, flushed with russet; flesh white, juicy, very melting, and sweet. July and August. One of the very best early sorts.

Clapp's Favourite. Fruit medium, regular-pyriform; eye large and open; skin greenish-yellow, with bright red; flesh white, juicy, rich, agreeably flavoured. August. A very delicious American Pear. The fruit must be eaten soon after being gathered.

Comte de Lamy. Fruit small, roundish; eye small, slightly depressed; skin greenish-yellow, flushed; flesh white, melting, juicy, and very pleasant. October. A dessert Pear of great excellence.

Conference Pear (Rivers'). Fruit large, long-pyriform, rounded at the apex; eye large and open; skin smooth and shining, dotted with russet; flesh yellow, with a salmon tint; stalk long. September and early October. Named after the National Pear Conference of 1885.

Délices d'Hardenpont. Fruit large, obovate, long, irregular; eye small and open; skin smooth, greenish-yellow, with pale russet; flesh white, melting, buttery, richly flavoured. November. A fine dessert Pear.

Deux Sœurs. Fruit large, irregular-pyriform; eye small and open; skin smooth, greenish-yellow, russety; flesh white, buttery, melting, very juicy, and finely perfumed. November. A remarkably fine Pear, of good quality.

Dorothée Royale Nouvelle. Fruit small, pyriform; eye open, in a small basin; skin pale yellow-russet, slightly flushed; flesh melting, juicy, with a delicious flavour. October and November. A very highly flavoured Pear.

Doyenné Boussoch. Fruit very large, obovate; eye open, in a small depression; skin pale yellow, with light russet; flesh white, juicy, melting, and rich. October. A very handsome Pear.

Doyenné Defays. Fruit medium, roundish-obovate; eye large and open; skin greenish-yellow, with reddish-russet on the side exposed to the sun; flesh very juicy, melting, and rich. December. A very delicious, late Pear. Tree hardy and a good bearer.

Doyenné du Comice. Fruit large, slightly bossed, obovate; eye small and open, in a deep basin; skin greenish-yellow, russet-flushed; flesh white, buttery, melting, very juicy, highly flavoured. November. One of the best Pears, requiring to be gathered early. The tree is a healthy grower and an excellent cropper; it forms a handsome pyramid on the Quince.

Pear—*continued.*

Doyenné Goubault. Fruit medium, short-pyriform; eye small, set in a deep basin; skin greenish-yellow-russet; flesh juicy, melting, and pleasant. January. A good winter Pear.

Dr. Hogg (Rivers'). Fruit small, obovate, even in outline; skin patched with russet, brownish-red where exposed, changing to bright red when ripe; eye open, set in a shallow depression; flesh melting, slightly gritty at the core, very juicy, and of singularly rich flavour. September. An enormous bearer; the fruit is best gathered a few days before it is ripe, and allowed to mature indoors. A seedling from GANSEL'S BERGAMOT.

Duchesse d'Angoulême. Fruit large, sometimes very large, much bossed, obovate; eye open, in a deep basin; skin greenish-yellow, with large patches of dull russet; flesh white, buttery, melting, and finely flavoured. October and November. A very fine, showy, and excellent Pear. Tree vigorous, healthy, and a good bearer on the Quince. The fruits of this variety are largely imported from France, to supply Covent Garden and other markets.

Duchesse de Bordeaux. Fruit medium, roundish; eye open, in a deep basin; skin brown-russet, flushed; flesh juicy, melting, and richly-flavoured. January. A late Pear, of great excellence.

Durandeau. Fruit large, regular-pyriform; eye small and open; skin dull, reddish; flesh white, melting, very juicy, with a pleasant perfume. November. Handsome and good.

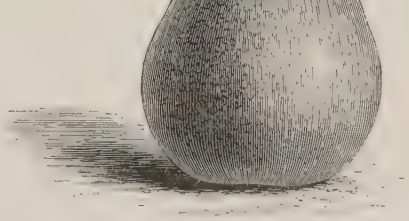


FIG. 52. PEAR EASTER BEURRÉ.

Easter Beurré. Fruit large, obovate; eye small, in a deep basin; skin dull green, with numerous dots of dull russet; flesh white, buttery, very juicy, and finely perfumed. January to March. One of the best late Pears. See Fig. 52.

Emile d'Heyst. Fruit medium, bossed, short-pyriform; eye small, set level with the surface; skin greenish-yellow, with patches of russet; flesh juicy, melting, with a rich, sugary flavour. October. A Pear of the highest merit, but it does not keep long.

Fertility (Rivers'). Fruit medium, obovate, greenish-russet, flushed; flesh firm, moderately juicy. October. A fine Pear for market.

Flemish Beauty. Fruit large, obovate; eye open, in a small depression; skin pale yellow, covered with patches of brown-russet, slightly flushed; flesh white, melting, and richly flavoured. October. A very excellent Pear; it should be gathered early.

Fondante d'Automne. Fruit medium, handsome, obovate; eye small and open; skin pale greenish-yellow, with patches of russet; flesh white, melting, very juicy and rich. One of the best October Pears. The tree is healthy, and a good bearer as a standard. It forms a handsome pyramid on the Quince.

Fondante de Malines. Fruit medium, roundish; eye small, in a deep basin; skin greenish-yellow-russet, slightly flushed; flesh white, juicy, melting, with the most delicious flavour. November and December. A Pear of great excellence.

Forelle. Fruit medium, short-pyriform; eye small, half-open; skin smooth, pale yellow, with small points of russet, brightly flushed with a fine vermilion-colour; flesh white, buttery, melting, and pleasant. November. A very fine-looking Pear. Tree hardy, and a good bearer.

Gansel's Bergamot. Fruit medium, roundish; eye small and open; skin greenish-yellow-russet, flushed; flesh white, juicy, rather gritty, with a fine aroma. November. A very excellent Pear, which requires a wall to bring its fruits to perfection.

Général Todleben. Fruit very large, irregular-pyriform; eye open, in a large basin; skin yellow, with large patches of brown-russet; flesh rosy, juicy, rather gritty, but melting, and with a pleasant flavour. December. A showy Pear, of good quality.

Gilles ô Gilles. Fruit large, roundish; eye open, in a deep basin; skin yellow, entirely covered with patches of dark orange-russet. October and November. A delicious stewing Pear.

Glou Morceau. Fruit large, irregular-obovate; eye open, in a deep basin; skin smooth, pale greenish-yellow with light russet; flesh white, melting, buttery, and finely flavoured. December. A Pear of great excellence. The tree succeeds as a standard in southern parts, but requires a wall in cold and exposed situations.

Pear—*continued.*

Grosse Calebasse. Fruit of immense size, pyriform; eye small, in a deep basin; skin pale grey-russet, slightly flushed. A good stewing Pear, recommended for its size.

Hacon's Incomparable. Fruit medium, roundish; eye small and open; skin greenish-yellow, with numerous spots of russet; flesh white, sweet, melting, and rich. December. An excellent dessert Pear. Tree hardy, good for a wall or an espalier.

Huyshe's Bergamot. Fruit large, oval; eye small and open; skin pale yellow, covered with brown-russet; flesh melting, juicy, with a sweet and fine flavour. November. A very delicious Pear.

Jargonelle. Fruit medium, pyriform; eye large and open, in a slight depression; skin smooth, greenish-yellow, flushed; flesh while, juicy, melting, and pleasant. August. One of the earliest dessert Pears, but it only keeps good a few days. The tree is vigorous, with a rather straggling, pendulous habit.

Jersey Gratioli. Fruit medium, roundish-obovate; eye open, in a small depression; skin greenish-yellow, with numerous points of russet, brightly flushed; flesh very melting, sugary, and pleasant. October. A fine-looking and first-rate Pear, keeping but a short time.

Joséphine de Malines. Fruit medium, short-pyriform; eye open, in a shallow basin; skin greenish-yellow with russet, flushed; flesh yellowish, with a tinge of red, very melting, juicy, and highly perfumed. January to March. A late Pear, of the highest merit. It succeeds well on the Quince, and is very prolific as an espalier or a bush.

Knight's Monarch. Fruit medium, roundish; eye small and open, in a bossed basin; skin greenish-yellow, with numerous points of russet; flesh very juicy, buttery, melting, and finely flavoured. December and January. A most delicious late Pear.

Louise Bonne of Jersey. Fruit medium, pyriform; eye small, in a deep basin; skin smooth, yellow-russet, brightly flushed; flesh white, buttery, melting, and rich. October and November. A very good and pretty Pear. The tree is a good bearer, and succeeds as a standard. It grows well on the Quince.

Madame André Leroy. Fruit very large, long-pyriform; eye large and open, in an uneven basin; skin greenish-yellow, with patches of grey-russet; flesh very melting, juicy, and highly flavoured. October and November. A very delicious and fine Pear, one of the best new sorts.

Madame Baptiste Desportes. Fruit large, slightly bossed, roundish; eye small and open, in a deep basin; skin yellow, with numerous dots and patches of russet; flesh very juicy, melting, with a fine perfume. October. A very excellent Pear.

Madame Treyve. Fruit large, bossed, obovate; eye small and open, in a deep basin; skin greenish-yellow, with numerous points of russet, brightly flushed; flesh white, melting, juicy, and very rich. September and October. A hardy and excellent sort, fruitful as a standard, and good for a wall. Succeeds as a pyramid on either the Pear or Quince.

Magnate (Rivers'). Fruit large, pyriform, even and symmetrical in outline; eye open, or nearly so, even with the surface; skin covered with dark brown-russet, mottled yellow where shaded; flesh yellow, melting, richly flavoured. October and November. Tree robust, hardy, stronger than LOUISE BONNE OF JERSEY, from which it is a seedling.

Maréchal de Cour. Fruit large, irregular-pyriform; eye large and open; skin pale yellow, thickly covered with patches of dull russet; flesh white, buttery, melting, with a sweet, rich flavour. October and November. A very fine and delicious Pear.

Marie Benoist. Fruit large, roundish; eye small, in a somewhat deep basin; skin greenish-yellow, entirely covered with brown-russet; flesh white, buttery, sweet, melting, and very juicy. January and February. A very good late Pear, large, and a good bearer.

Marie Louise. Fruit large, regular-pyriform; eye small and open, in a deep basin; skin greenish-yellow, with brown-russet; flesh white, buttery, and most richly flavoured. October and November. One of the most delicious Pears in cultivation. On a wall, the fruit attains a large size, and is invariably of good flavour.

Marie Louise d'Uccle. Fruit medium size, obovate; eye large and open, in a pretty deep basin; skin greenish-yellow, with brown-russet; flesh melting, very juicy, buttery, with a fine aroma. October. A good Pear, though not to be compared with MARIE LOUISE.

Maud Hogg. Fruit medium, obovate; eye open, in an irregular basin; skin covered with brown-russet, slightly flushed; flesh juicy, sweet, buttery, and rich. December.

Napoléon. Fruit large, obovate; eye almost closed, in a small basin; skin greenish-yellow, with numerous small points of russet; flesh white, tender, very juicy, melting, and sweetly flavoured. A most refreshing and good Pear, with fine aroma.

Ne Plus Meuris. Fruit medium size, very much bossed, roundish; eye half-open, generally prominent; skin greenish-yellow, with numerous dark russet specks; flesh white, juicy, melting, and richly perfumed. January to March. A very excellent late Pear.

Pear—*continued.*

Nouveau Poiteau. Fruit large, obovate; eye almost closed; skin greenish-yellow, freckled with russet: flesh white, melting, very juicy, with a fine flavour. November. A very good Pear, keeping only a short time.

Nouvelle Fulvie. Fruit medium, pyriform, very much bossed; eye almost closed, in a pretty deep basin; skin yellow, thickly covered with dull russet, sometimes flushed; flesh white, juicy, melting, with a rich perfume. November and December. A first-rate Pear. The tree is hardy, and grows well.

Olivier de Serres. Fruit medium, bossed, roundish; eye large, and closed, in a deep basin; skin dark orange-russety; flesh white, juicy, very melting, deliciously flavoured. January. A Pear of great merit.

Passe Colmar. Fruit medium, short-pyriform; eye open, in a wide basin; skin green, with numerous points of russet, changing to greenish-yellow-russet, flushed when it ripens; flesh very juicy, melting, most richly flavoured. November and December. A good and well-known dessert Pear. The tree succeeds admirably on the Quince as a bush or pyramid; it requires a wall in cold localities.

FIG. 53. PEAR PASSE CRASSANE.

Passe Crassane. Fruit medium, roundish-obovate; eye large and open, in a pretty deep basin; skin greenish-yellow, with numerous dots of brown-russet; flesh rather gritty, half-melting, but finely perfumed. January to March. One of the finest late Pears known. See Fig. 53.

Pitmaston Duchess. Fruit very large, irregular-pyriform; eye large and open, in a wide basin; skin greenish-yellow, with patches of dull russet, sometimes fine lemon-yellow colour; flesh white, melting, very juicy, and excellent. October and November. A very handsome Pear, of first quality. The tree grows well on the Pear, and also on the Quince, and succeeds as a standard, on a wall, as an espalier, or in an orchard-house.

Red Doyenné. Fruit medium, obovate; eye small and closed; skin greenish-yellow, entirely covered with reddish-russet, slightly flushed; flesh white, buttery, melting, and richly flavoured. November. An excellent dessert Pear.

Rousselet de Rheims. Fruit small, pyriform; eye small and open, almost even with the surface; skin greenish-yellow, freckled with russet, slightly flushed; flesh white, half-melting, juicy, with a delicious, refreshing perfume. September. A fine, early Pear, keeping but a short time.

Rousselet Enfant Prodigue. Fruit medium, irregular-obovate; eye large and open, in a somewhat deep and uneven basin; skin smooth, deep green, with numerous dots of russet; flesh not very melting, rather gritty, but juicy, and finely flavoured. November. A very nice acidulous Pear.

St. Germain. Fruit large, bossed, obovate; eye small, set in a bossed depression; skin greenish-yellow, with numerous markings of dark russet; flesh very juicy, melting, slightly gritty, richly flavoured. December and January. A good winter Pear.

Seckel. Fruit small, short-pyriform; eye small and open, level with the surface; skin brownish-red; flesh juicy, melting, with a rich aromatic flavour. October. A most delicious and much-esteemed little Pear. The tree bears well as a pyramid or standard on the Pear stock, or double-grafted, but does not succeed on the Quince.

Soldat Laboureur. Fruit large, irregular-pyriform; eye large, almost closed; skin pale yellow, covered with small points of russet; flesh juicy, melting, buttery, and pleasant. November.

Souvenir du Congrès. Fruit very large, bossed, pyriform; eye large and open, in a deep basin; skin yellow, covered with reddish russet; flesh tender, melting, juicy, with a rich vinous flavour. September. A delicious Pear, highly esteemed; excellent on a wall.

Suffolk Thorn. Fruit medium, roundish; eye small and open, in a deep basin; skin pale yellow, covered with grey russet; flesh white, juicy, very melting, and finely flavoured. October. A first-rate Pear.

Pear—*continued.*

Summer Beurré d'Aremberg. Fruit small, even-turbinate; eye small, very deeply set; skin yellow, with numerous points of reddish-russet; flesh juicy, melting, very buttery, highly perfumed. September. An excellent, refreshing Pear.

Summer Doyenné. Fruit small, roundish; eye small, partly closed; skin yellow, freckled with russet, brightly flushed; flesh white, very juicy, melting, and sweetly flavoured. August. One of the best early sorts.

Swan's Egg. Fruit medium, roundish; eye small, almost closed; skin green, with numerous dots of dull russet; flesh greenish, juicy, melting, and pleasantly flavoured. November. A very old and esteemed Pear. Succeeds well as a standard.

Thompson's. Fruit medium, short-pyriform; eye open, in a small depression; skin yellow, with numerous dots of reddish-russet; flesh white, very juicy, buttery, melting, and richly flavoured. November. One of the best English Pears. The tree succeeds double-grafted and bears profusely. It forms a good standard, and is also adapted for a wall or an espalier.

Triomphe de Jodoigne. Fruit large, obovate; eye open, almost level with the surface; skin yellow, covered with small points of russet; flesh white, melting, juicy, and good. December. A handsome and excellent Pear.

Urbanistes. Fruit medium, obovate; eye small and closed, in a deep basin; skin pale yellow, freckled with russet, slightly flushed; flesh white, juicy, melting, and pleasantly flavoured. October and November. A most delicious Pear, which requires a wall; it is not a good bearer, unless under favourable conditions.

FIG. 54. PEAR UVEDALE'S ST. GERMAIN (Small Fruit).

Uvedale's St. Germain. Fruit very large, irregular-pyriform; eye large and open, almost level with the surface; skin smooth, dark green, brightly flushed. A delicious stewing Pear, sometimes weighing over 2lb. See Fig. 54.

Van Mons Léon Leclerc. Fruit large, uneven-pyriform; eye open, in a shallow basin; skin green, with light russet; flesh white, melting, very juicy, and rich. November. A fine Pear, deliciously flavoured. The tree succeeds double-grafted, or on the Pear stock, and requires a wall, except in warm climates.

Verulam. Fruit large, obovate; eye open, in a shallow basin; skin dark orange-yellow, entirely covered with dots of dull russet. December till March. A very fine stewing Pear.

Vicar of Winkfield. Fruit large, long-pyriform; eye small and open; skin greenish-yellow, with numerous dots of pale russet; flesh white, half-melting, juicy, and pleasant. November to January. A tolerably good stewing Pear. It requires a warm situation.

White Doyenné. Fruit medium, regular-obovate; eye small and closed; skin smooth, greenish-yellow, brightly flushed; flesh white, melting, juicy, and finely flavoured. October. One of the finest autumn Pears.

Williams' Bon Chrêtien. Fruit large, irregular-pyriform; eye open, set in a shallow depression; skin smooth, fine, pale yellow; flesh white, tender and melting, of delicious flavour. August and September. A dessert Pear of great excellence; it keeps but a short time. The tree succeeds as a standard, pyramid, or bush, and is very fertile on either the Pear or Quince. See Fig. 55.

FIG. 55. PEAR WILLIAMS' BON CHRÊTIEN.

Winter Nelis. Fruit small, roundish; eye open in a shallow basin; skin greenish-yellow, much covered with dull, russety dots; flesh melting, juicy, and rich. November and December. One of the richest-flavoured Pears.

Zéphyrin Grégoire. Fruit medium, roundish; eye very small, almost level with the surface; skin greenish-yellow, with pale russety points; flesh white, very juicy, melting, and deliciously perfumed. December and January. A very excellent winter Pear.

Selections of Sorts.

For Culture on Walls. Bergamotte Esperen, Beurré Bosc, Beurré d'Aremberg, Beurré Diel, Beurré Rance, Beurré Sterckmans, Beurré Superfin, Chaumontel, Doyenné du Comice, Duchesse d'Angoulême, Easter Beurré, Forelle, Gansel's Bergamot, Général Todleben, Glou Morceau, Hacon's Incomparable, Jargonelle, Joséphine de Malines, Louise Bonne of Jersey, Madame Treyve, Marie Louise, Napoléon, Ne Plus Meuris, Passe Colmar, Pitmaston Duchess, Souvenir du Congrés, Thompson's, Urbanistes, Van Mons Léon Leclerc, Winter Nelis.

For Pyramids, Bushes, &c., in the Open Ground. Alexandre Lambré, Althorp Crassane, Baronne de Mello, Bergamotte Esperen, Beurré Bosc, Beurré Capiaumont, Beurré Clairgeau, Beurré d'Amanlis, Beurré d'Aremberg, Beurré Diel, Beurré Rance, Beurré Superfin, Comte de Lamy, Doyenné du Comice, Duchess d'Angoulême, Easter Beurré, Flemish Beauty, Fondante d'Automne, Forelle, Glou Morçeau, Knight's Monarch, Louise Bonne of Jersey, Maréchal de Cour, Marie Louise, Ne Plus Meuris, Passe Colmar, Pitmaston Duchess, Souvenir du Congrés, Williams' Bon Chrêtien, Winter Nelis, Zéphyrin Grégoire.

For Standards. Althorp Crassane, Autumn Bergamot, Beurré Capiaumont, Beurré d'Amanlis, Beurré Diel, Beurré Rance, Beurré Superfin, Bishop's Thumb, Broompark, Citron des Carmes, Comte de Lamy, Fertility, Fondante d'Automne, Knight's Monarch, Louise Bonne of Jersey, Marie Louise, Marie Louise d'Uccle, Seckel, Suffolk Thorn, Swan's Egg, Williams' Bon Chrêtien, Winter Nelis.

Best Stewing Pears. Black Pear of Worcester, Catillac, Uvedale's St. Germain, Verulam.

FUNGI. Comparatively few Fungi have been recorded in Britain as found on Pear-trees, except those that grow on the fruit, and some on branches and leaves, mostly after these parts have been dead for some time. It is unnecessary here to deal with the latter Fungi; although it is not unlikely that some of them, in their early stages of growth, live in the tissues of the Pear-trees. Of such as grow on living leaves or branches, one of the most important is that known as *Roestelia cancellata* (see Fig. 56), which causes the leaves to become covered with large, raised spots, or patches, at first yellow, but soon becoming red. These spots are visible on both surfaces, but they are deeper-red above, and are encircled with a broad, dark border. On the lower surface may be seen, on each patch, a variable number of ovate bodies, about $\frac{1}{8}$in. high, and rather less in breadth. These are

Pear—*continued.*

called peridia, and contain minute, nearly globular, simple spores, which escape, when mature, through fine slits in the sides of the peridia. This Fungus cannot be called common in England, and it has not been recorded from Scotland; but in many Continental localities, it is so abundant as to do much injury to the trees.

FIG. 56. PEAR LEAVES ATTACKED BY ROESTELIA CANCELLATA (believed to be a stage in the development of *Gymnosporangium Sabinæ*)—*a*, Upper Surface, and *b*, Lower Surface, of Leaf; *sp*, Spot on Upper Surface, surrounded with dark border; *p*, Spot on Lower Surface, bearing Peridia, as described in the text.

Some years ago, the Danish botanist, Oersted, made investigations into the development of this Fungus, which led him to the result, now very generally accepted by botanists, that it is only a stage in the life-history of a Fungus which was regarded in former times as entirely disconnected with the *Roestelia*, and which grows on the branches of certain species of *Juniper*, notably of the Savin (*J. Sabina*). This latter Fungus, known as *Podisoma fuscum*, Cda., or *Gymnosporangium fuscum*, DC., induces a thickened state of the branches of its host. From this project numerous cylindrical or bluntly conical

FIG. 57. JUNIPER TWIG ATTACKED BY GYMNOSPORANGIUM FUSCUM—*c*, Outgrowths, in which Spores are formed.

outgrowths, often ¾in. to 1½in. long (see Fig. 57, *c*). These outgrowths are at first yellow, but become brown; and, when moistened, they assume the consistence of jelly. The microscope shows that they are made up of colourless, one-celled filaments, imbedded in the jelly, and running from within outwards, each of which bears at its tip a small spore of an elliptical or biconical form, with a division wall in the middle, so that it is made up of two cells, base to base, as in *Puccinia*. The spores lie on the surface of the body, and, when it dries,

Pear—*continued.*

they are blown about by the wind. When one germinates, it forms one or two filaments, made up of a row of cells; and from each of the cells, from the tip of this for a little way down, a branch grows, and forms on its tip a minute sporidium. These are believed, when they fall on Pear leaves, to give rise to the *Roestelia cancellata*. The spores of this, in turn, are now believed to be the cause of the *Gymnosporangium*, when they fall on the proper hosts. This phenomenon of a complex cycle, believed to exist, peculiarly well marked, in many species of **Puccinia**, is further referred to under that heading. The diseased Pear leaves should be removed and destroyed as soon as they show well-marked signs of the Fungus, and before the spores are scattered from them. The species of *Juniperus* that nourish *Gymnosporangium* should not be permitted to grow near Pear-trees, especially if the Fungus shows itself on the Juniper bushes.

In August of 1885, a communication was made to the American Association for the Advancement of Science, by Mr. J. C. Arthur, regarding the cause of the disease known as Pear Blight. This disease attacks Apple as well as Pear trees, and causes the death of the diseased parts. A yellowish, viscid substance is formed, apparently at the expense of the starch in the branch or other part attacked. Prof. Burrill found that the diseased tissues invariably contained a microscopic Fungus, named by him *Micrococcus amylovorus*, belonging to the group of *Schizomycetes*, so prominent of late years as the causes of disease in man and in domestic animals. Mr. Arthur has made numerous experiments, which have convinced him that the *Micrococcus* is the direct cause of Pear Blight. Cure of the disease, after it is once established in a branch, seems impossible; but prevention of its spread should be aimed at, by the removal and burning of all parts that show any signs of the disease. Infection of healthy plants is easily accomplished if cracks or wounds on their surface are brought into contact with any of the diseased tissues.

"Cracking" in Pears, and in Apples, may be due to more than one cause; but one of the worst forms is the work of a Fungus, which, on Pears, has been called *Fusicladium pyrinum*, Fckl., but is now generally referred, as a variety, to *F. dendriticum*, Fckl., now more often called *Cladosporium dendriticum*, Wallr., which, in its typical state, grows on Apples. This Fungus grows on the leaves and young twigs, and also on all parts of the flowers, often preventing the fruits from setting; and if they do set, they are crippled and injured in growth, and are rendered of little value by the Cracking of the skin of the fruit as it ripens. On the leaves, the Fungus gives rise to black spots, from ¼in. to ½in. across, branching from the centre like a minute tree, whence the name *dendriticum*, or tree-like. On the fruit, it gives rise to similar spots, which very soon become irregularly rounded, with a narrow, white margin, surrounding a depressed black spot. Around the white margin there is a dark border, due to the spreading mycelium of the Fungus. On examining the spots with a low magnifying power, it is evident that the margin is the edge of the epidermis or skin of the fruit, and that the dark, depressed spot is occupied with a mass of minute bodies. On using a lens of higher power, it is seen that these bodies are the ends of club-shaped or narrowly-ovate, brown spores, or conidia, which are fixed by the narrow end to the tip and sides of erect, short stalks. The conidia are simple, or are occasionally two-celled. The stalks are produced on the surface of a mass or stroma of closely-packed small cells, formed by division of the threads of the mycelium by cross walls. The mycelium does not penetrate far into the fruit. It remains almost wholly in the cells of the epidermis, and between them and the next layer; though a few branch-threads are

Pear—*continued.*

pushed inwards also. The spots are apt to run together; and, in bad cases, they may cover a large part of the surface of the fruit. Sometimes they do not develop conidia, but the short cells of the stroma may break off, and may act as conidia, since they push out mycelium threads, and reproduce the Fungus. This condition is *Spilocæa pomi*, of Fries. The Fungus continues to grow on the fruit after it is gathered and stored, and greatly diminishes its marketable value, both by rendering it unsightly, and by causing decay. The variety *pyrinum* differs from the form on Apples chiefly in the rather less regular form of the conidiophores or stalks. Remedies must be directed to prevention, since no means are known to effect a cure. Diseased trees, and also those fruits that assume the diseased condition in the storehouse, should be destroyed. Certain varieties are peculiarly liable to injury from this Fungus, *e.g.*, the Louise Bonne, and should not be planted where liable to infection from it. Mr. Smee has recommended as a remedy to lift the trees, and give them some good top-spit loam.

Still another Fungus, destructive to the fruits of Pears, and also hurtful to Apples, Plums, Cherries, and Apricots, is that now frequently called *Oidium fructigenum*, Lk. It has also received the names of *Torula fructigena*, *Monilia fructigena*, *Oospora fructigena*, and *Acrosporium fructigenum*; and, under one or other of these names, it has been often noticed as injuring the fruits of Rosaceous trees. It breaks through the epidermis of the fruits in the form of small, yellowish-white, convex masses or tufts of closely-packed, erect filaments. These tufts are often grouped in concentric fashion. The filaments, under the microscope, prove to be made up of rows of bead-like cells, which tend to separate from one another, and become elliptical or ovate, and act as conidia, germinating on any suitable food. The filaments branch freely, both near the tips and along the sides. Pears and Apples usually show only diseased patches; but Plums, at times, are so diseased that they become entirely white, or yellowish-white. The mycelium has been noticed on half-grown fruit on the trees, but the tufts in general appear abundantly only on the ripe fruits, especially on such as fall, and lie for some time on the ground. It has been observed that the presence of this Fungus on the fruits renders the latter less liable to rot; and this has been explained by the fact that the Fungi that cause rottenness find the fruits less favourable for their nourishment after the growth of the *Oidium*. That it injures the fruits, however, cannot be doubted, and they are rendered less suitable for man's use; yet this Fungus can scarcely be classed among the very injurious species. Remedies against it must be very much the same as against *Cladosporium dendriticum*; no cure is yet known.

INSECTS. The Pear-tree is the food-plant of numerous insects, but only a comparatively small number of species ever do serious damage. All parts of the tree are liable to be attacked. The roots, as in most trees, are at times cut through by Mole Crickets, grubs of Cockchafers, and other subterranean foes. For remedies, *see* **Mole Cricket** and **Cockchafer.**

The trunk is bored into, especially in trees that have become sickly from any cause, by beetles (*see* **Scolytidæ**), and by the larvæ of certain moths, of which the most hurtful are the Leopard Moth, the Goat Moth, and the Red-belted Clearwing (*see* **Sesia**). The last species (*Sesia myopæformis*) hardly resembles a moth, as the wings are narrow, and not scaly over most of their surface, while the body is rather slender, and black, with a bright red belt round the middle of the abdomen. The spread of wings is about ⅝in. The larvæ are sometimes very numerous. There is no satisfactory method of curing trees severely attacked by beetles, or

Pear—*continued.*

by other insects, where the larvæ live between the bark and the wood, or in the wood. The mature insects should be caught and destroyed, so far as practicable; and, if there are signs that the insect-tenanted part is of small extent, it may be advantageous to cut out the bark, or the wood, in which the insects live; but this can seldom be done. In the case of the **Goat Moth** and the **Leopard Moth**, the suitable treatment is given under their respective headings. It is sometimes well to uproot and destroy the tree while the larvæ are in it, in order thereby to prevent them from spreading to adjoining trees. The loss is diminished by the fact that trees inhabited by insects in bark or wood are, as mentioned above, usually in a sickly state. If it is desired to preserve the tree, it ought to be stimulated in every practicable way to active growth; as it may thus be enabled to resist its parasites, and to repair the injuries it has suffered. Perhaps washes of soft soap, or of lime, or of other substances disagreeable to insects, might protect the parts subject to attack at the time when the insects are laying their eggs.

The younger branches are frequently attacked by the Pear Oyster Scale (*Aspidiotus ostreæformis*). For an account of the treatment suited for the removal of this pest, which frequently proves very hurtful, *see* **Scale Insects.** It is the female that is present on the branches, like a minute oyster-shell, about $\frac{1}{16}$in. across, slightly convex, wrinkled, and grey or reddish. When this scale is removed, the female is seen, rounded or heart-shaped, pale yellowish, and unprovided with limbs. The male is smaller, is ochreous in colour, and has two wings, long antennæ, and six legs. Washing the branches with soft soap and hot water, in winter, will usually remove these Scale insects. Painting the branches with linseed oil, or with paraffin, has also proved successful.

The leaves are preyed upon by numerous insects. While young, they are gnawed by *Otiorhynchus raucus*, and by other Weevils (*see* **Rhynchites**). For remedies against these insects, *see* **Otiorhynchus.**

The greater part of the insect foes of the Pear-tree belong, however, to the *Lepidoptera*. The larvæ of not a few species feed on its leaves. Occasionally, those of the large Tortoiseshell Butterfly (*Vanessa polychloros*), and of the Black-veined White Butterfly (*Aporia Cratægi*) (*see* **Hawthorn Caterpillars**), eat the leaves; but far more hurtful are those of the Lackey Moth (*Bombyx neustria*), and of the species of *Liparis*. A few species of the *Noctuæ* are injurious to the Pear-tree, one of the more striking in appearance being the larva of the Dagger Moth (*Acronycta psi*), which bears a black-pointed, fleshy hump on the back of the fifth ring of the body, breaking a broad, yellow, black-bordered, median, dorsal band. The other *Noctuæ*, the larvæ of which are likely to be found on the tree, are less noticeable. Those of several Geometer Moths feed on Pear-leaves, as well as on other trees. Among the more destructive are the species of *Hybernia*, and the Winter Moth (*Cheimatobia brumata*). A good many of the *Tortricina* (*see* **Moths**) also live on the Pear-tree, and, like the Geometers, they almost all live between leaves spun together, or rolled into a tube: hence, they are protected from birds and other foes. Mention is here made of the scientific names of only a few of those known to live on this tree, viz., *Tortrix ribeana*, *Lozotænia rosana*, *Hedya ocellana*, *Dictyopteryx contaminana*, and *Crœsia holmiana*. Of the *Tineina* (*see* **Moths**), a few live in the leaves, burrowing in their substance, *e.g.*, *Coleophora hemerobiella*.

Beyond capturing the mature insects when possible, little can be done for prevention of ravages by larvæ on Pear-trees, except as regards the Winter Moths, the wingless females of which may be checked on their way

Pear—*continued.*

from the soil up the tree, by a belt of sticky material round the tree-trunk. If the tree is trained, the wall, or the support, should also have a belt of the same substance. The larvæ of the butterflies, and of the larger moths, should be picked off and destroyed. The larvæ of the Tortrices and Geometers may be either picked off or shaken into an old sheet, or other cloth, and should be swept up and destroyed at once. Leaf-miners can be killed by pressure with finger and thumb, but the harm done by them is, as a rule, too slight to render this labour necessary. Certain Sawflies are very hurtful to fruit-trees, and, among others, to the Pear-tree. The worst of these foes is the Slugworm, or larva of *Eriocampa limacina*. For an account of the injuries done by it, and remedies, *see* **Slugworms.**

Mr. Buckton, in his "Monograph of British Aphides," mentions *Aphis pyraria* and *A. lentiginis* as obtained by him from Pear-trees in England, and says that the former was so abundant on one tree as to entirely cover it with excretions. Other kinds have been recorded by various entomologists. All the Aphides may be treated in the same way. *See* **Aphides.** To the allied genus *Psylla* belong several species that feed on the Pear, and the following have been recorded from Britain: *P. pyrisuga*, Först., *P. apiophila*, *P. pyricola*, and *P. simulans*.

FIG. 58. PSYLLA PYRISUGA (the Line below the Insect shows the natural length).

Of these, *P. pyrisuga* (see Fig. 58) is probably the most hurtful. In Ormerod's "Manual," it is named *P. Pyri*, Schmidb., and is also called the Pear Sucker. The female is ⅛in. long, and is not very unlike a Frog Hopper in form; but the wings are transparent. It is able to leap considerable distances, by means of the large thighs of the hindmost pair of legs. It is usually at first of a greenish colour, with red eyes; but it becomes, in a short time, variegated with carmine-red, brown, and black, and these colours extend to the base of the wings, and to the legs. The insects live on juices of the plants they infest, drawing them in through a beak, which, when at rest, lies close against the breast. The

FIG. 59. LARVA OF PSYLLA PYRISUGA (the Line shows the natural length).

male is about ⅛in. long. The larvæ (see Fig. 59) and pupæ, as well as the mature insects, live upon Pear-trees, and, occasionally, upon Apple-trees also. They suck the juices from the leaves, and from the young shoots, and discharge their sticky excretions over all parts of the trees. They are thus hurtful both by withdrawing the sap, and by clogging the surfaces of leaves and twigs, so that these parts are unable to assist in nourishing the plant. The mature insects usually pass the winter sheltered in crevices under bark, &c. A remedy found serviceable is to apply tobacco infusion, soapsuds, or the other solutions employed against **Aphides** (which *see*).

Pear leaves are sometimes severely injured by Gall

Pear—*continued.*

Mites, which give rise to blistered spots in them (see Fig. 60). These blisters are small, and, at first, yellowish or red; but, in a short time, they tend to become brown, and then they dry up, and fall out of the leaf, if pressed on, while the rest of the leaf may still be apparently healthy. Very often, the blisters are so numerous that many of them unite, and the leaf may become covered with them over almost the whole surface. In severe cases, almost every leaf on a tree may

FIG. 60. PEAR-LEAF ATTACKED BY PHYTOPTUS PYRI—*a*, Leaf recently attacked by Mites; *b*, Leaf with old Mite Galls.

be more or less injured, and many of them destroyed, so that the trees are much weakened. Moreover, the animals shelter themselves in the buds in winter, and a tree, when once infected, continues to suffer year after year. A microscopic examination of a section taken

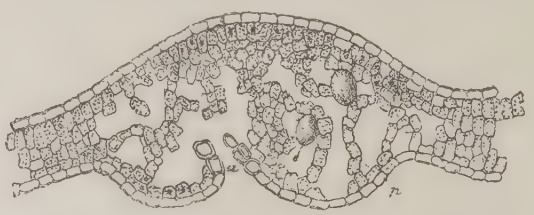


FIG. 61. BLISTER FORMED ON LEAF BY PHYTOPTUS PYRI — *a*, Opening of Gall; *p*, Tissue of Leaf altered by Mites; *e*, Egg of Mite.

from a blister (see Fig. 61) shows that the cells in the middle of the leaf become torn asunder, so as to leave air-spaces larger than before; and the surfaces of the leaf are thus pushed farther apart. In the middle of the blister, on its lower surface, is a small opening, which permits the Mites to pass out of the blister. These animals are named *Phytoptus Pyri*. *See* **Mites.**

It is so difficult to completely effect a remedy, that it is not advisable to give the labour, save in the case of trees of peculiar value; and it is preferable to burn the diseased trees, to prevent the evil spreading. To destroy the Mites, the most successful course is, at the moment

Pear—*continued.*

when the young leaves are forming on the new summer shoots, to cut off the diseased leaves formed in spring, and burn them, since, at this period, almost all the Mites will be in the galls in these leaves. It is of little use to attempt a remedy at other seasons, or to employ other means.

The flowers and the young fruits occasionally suffer from *Anthonomus pomorum* (*see* **Apple-blossom Weevil**); and the Pears are eaten into by the larva of *Carpocapsa pomonana* (*see* **Apple or Codlin Grub**), and by Woodlice.

PEAR, ALLIGATOR. *See* **Persea gratissima.**

PEAR, ANCHOVY. *See* **Grias.**

PEAR, AVOCADO. *See* **Persea gratissima.**

PEARCEA. Included under **Isoloma** (which *see*).

PEAR, GARLIC. *See* **Cratæva.**

PEARL FRUIT. *See* **Margyricarpus.**

PEARL WEED, or **PEARL WORT.** A common name for Sagina (which *see*).

PEAR, PRICKLY. *See* **Opuntia.**

PEAR-SHAPED. Obovoid or obconical, with a tapering base.

PEAR SLUG. The larva of *Eriocampa limacina* (*see* **Slugworms**). It is also called Plum Slug, and is named after several other plants in like manner, as it feeds on a number of fruit-trees and shrubs. For description and remedies, *see* **Slugworms.**

PEA, SWEET. *See* **Lathyrus odoratus.**

PEAT. Bog earth.

PEA-TREE. *See* **Sesbania.**

PEA-TREE, SIBERIAN. *See* **Caragana.**

PEA WEEVIL. *See* remarks on INSECTS, under **Pea.**

PEBBLE MOTH. *See* **Pionea forficalis.**

PECAN NUT-TREE. *See* **Carya olivæformis.**

PECTINATE. Pinnatifid, with numerous, closely-placed, narrow segments, resembling the teeth of a comb.

PECTIS (from *pecten*, a comb; referring to the pappus). Including *Laurentea.* ORD. *Compositæ.* About forty species have been referred to this genus, but the number may be reduced. They are greenhouse or half-hardy, annual or perennial herbs, sometimes diffuse or prostrate, sometimes erect, slender, and glabrous, and are found in the warmer parts of America, from Brazil or Bolivia as far as Mexico. Flower-heads yellow (or white), small or mediocre, often narrow, slender-stalked or sessile, solitary or corymbose; involucre of a single row of bracts; receptacle small, naked; pappus bristly or scaly. Leaves opposite, usually narrow and entire, and furnished with pellucid dots. The species have but little horticultural value, although the under-mentioned is worth cultivating. It requires treatment similar to other half-hardy annuals.

P. angustifolia (narrow-leaved). *fl.-heads* yellow, fragrant. *l.* coarsely ciliate, linear. *h.* 4in. to 6in. North-west America, 1865. A branching, half-hardy annual, with a compact habit and dense inflorescence. (B. M. 6286.)

PEDALINEÆ. A small natural order of annual or perennial herbs, rarely sub-shrubs, with vesicular glands, natives of the warmer regions of the globe, but most abundant in Africa. Flowers hermaphrodite, irregular, those of Old World genera axillary, solitary, or rarely fasciculate; those of American genera disposed in terminal racemes, shortly or very shortly pedicellate; calyx gamosepalous, parted nearly to the base into four, rarely five, segments, or rarely membranous, five-fid, and spathe-like; corolla gamopetalous, tubular, often oblique or decurved at base, and more or less oblique at back; limb of five spreading lobes, usually bilabiate, imbricated; stamens alternating with the corolla lobes, usually included. Fruit capsular, nut-like, or rarely sub-drupaceous.

Pedalineæ—*continued.*

Leaves opposite, or the upper ones alternate, entire, toothed, incised, or pedatifid. Sesamum or Gingilie Oil, largely used by Orientals, is extracted from the seeds of *Sesamum indicum* and *S. orientale*; but the species, generally speaking, have not much economic value. The order comprises a dozen genera, and only about forty species. Illustrative genera are: *Martynia, Pedalium, Pterodiscus,* and *Sesamum.*

PEDALIS. In length, 1ft.

PEDALIUM (from *pedalion*, a rudder; in reference to the dilated angles of the fruit). ORD. *Pedalineæ.* A monotypic genus. The species, *P. murex*, a native of India and tropical Africa, is probably now lost to cultivation. It is a sparingly-branched, glabrous annual, with opposite or alternate, stalked leaves, from the axils of which spring the solitary, sub-erect, shortly-stalked, yellow flowers.

PEDATE, PEDATIFID. Resembling a bird's foot; palmately parted or divided, with the lateral divisions cleft into smaller segments. A Pedate leaf is shown at Fig. 62.

FIG. 62. PEDATE LEAF.

PEDATIPARTITE, PEDATISECT. Pedately parted in such a manner that the segments become distinct leaflets.

PEDICEL. The support of a single flower; the last branch of the inflorescence.

PEDICULARIS (from *pediculus*, a louse; it was supposed to cause sheep to be infested with that insect). Lousewort. ORD. *Scrophularineæ.* Of this genus, above 120 species have been enumerated; they are mostly hardy perennial (rarely annual?) herbs, broadly dispersed, but mainly in the Northern hemisphere. Flowers in bracteate spikes or racemes, honeyed, often secund; calyx tubular or campanulate, two or five-toothed; corolla with a cylindrical or swollen tube, and a bilabiate limb, the upper lip of which is galeated. Leaves alternate or whorled, very rarely sub-opposite, once or much-pinnately divided, rarely simple and toothed; floral ones decreasing, mostly bract-like. Some of the species are pretty little plants; they succeed if planted in a moist, peaty soil, and are propagated most readily from seeds. A selection of the species best known to cultivation is given below; they are hardy perennials, except where otherwise indicated. Most of the species are not long-lived in cultivation; they are probably all more or less parasitic on the roots of other plants.

P. canadensis (Canadian). Wood Betony. *fl.* wholly cream-colour, or with the obtuse, bidentate galea of the corolla purple; calyx hairy. July and August. *l.* pinnatifid, with obtuse, crenated segments. Stem simple. *h.* 6in. to 12in. North America, 1780. (B. M. 2506; S. B. F. G. 67.)

P. comosa (tufted). *fl.* usually cream-coloured, in a short, dense spike; galea of corolla obtuse, bidentate. July and August. *l.* pinnate; leaflets pinnatifid and toothed. Stem simple, downy. *h.* 6in. to 2ft. Eastern Europe, &c., 1775.

P. dolichorhiza (long-rooted).* *fl.* golden-yellow, in a terminal spike; upper lip of corolla curved down into a short, straight beak; lower lip trilobed. Summer. *l.* pinnate, with toothed leaflets. *h.* 1ft. to 1½ft. Eastern Europe, &c., 1884. A pretty plant. (R. G. 1884, p. 54.)

P. flammea (flame-coloured).* *fl.* pale red; galea of corolla very blunt, rounded. May and June. *l.* pinnate; leaflets roundish, imbricated backwards, doubly toothed. Stem simple. *h.* 6in. to 12in. Arctic Norway, Iceland, &c., 1775.

P. flava (yellow). *fl.* yellow, striped with red; calyx woolly; galea of corolla obtuse, very convex, bidentate. July. *l.* fleshy, deeply pinnatifid, with distant, oblong, coarsely and doubly-toothed segments. Stem simple. *h.* 6in. Siberia, 1828.

P. foliosa (leafy). *fl.* cream-colour, in a dense spike; galea of corolla downy or glabrous, very blunt. July. *l.* pinnatifid, with lanceolate, unequally-toothed segments. Stem simple, short and almost naked, or tall and leafy. *h.* 6in. to 3ft. Europe, 1786. (J. F. A. 139.)

P. incarnata (flesh-coloured). *fl.* pale red; calyx hoary-pubescent; galea of corolla with an obtuse or emarginate, falcate beak. June

Pedicularis—*continued.*

and July. *l.* deeply pinnatifid, with unequally-toothed, linear-lanceolate segments. Stem simple. *h.* 1ft. Europe, &c., 1796. (J. F. A. 140.)

P. megalantha (large-flowered). *fl.* yellow; corolla large, with a tube twice as long as the calyx; beak of galea proboscis-like, twisted and trifid; pedicels and calyces villous. June. *l.* pinnatifid, with oblong or ovate, pinnatifid or serrate segments. Stem simple. *h.* 6in. to 12in. Himalayas, 1836. (R. G. 943.)

P. palustris (marsh-loving). *fl.* dull pink; upper lip of corolla obtusely three-lobed, lower broad. May to September. *l.* 1in. to 3in. long, linear-oblong, pinnate; segments oblong, crenate, obtuse or pinnatifid, the ultimate ones rounded. Stem stout, erect, branched above. *h.* 6in. to 18in. Europe (Britain). (F. D. 2055; Sy. En. B. 996.)

P. recutita (circumcised). *fl.* purple, in a compact, leafy spike; calyx sometimes hairy; galea of corolla very blunt. July and August. *l.* pinnatifid, with deeply-toothed segments. Stem simple. *h.* 1ft. to 1½ft. Central Europe, 1787. The habit of this species is singular, the leaves being collected under the spike. (J. F. A. 258.)

P. rostrata (beaked). *fl.* purple, borne in a few-flowered raceme; galea of corolla falcately beaked, the beak truncate at apex. July and August. *l.* pinnate; leaflets or segments pinnatifid. Stem declinate. *h.* 3in. to 9in. Western Europe, 1819. (J. F. A. 205.)

P. Sceptrum-Carolinum (Charles's Sceptre).* *fl.* golden-yellow, twin or tern, disposed in an interrupted spike; corolla 1in. long, the lower lip tinged with purple or blood-colour. August. *l.* pinnatifid, with ovate, crenulated lobes. Stem few-leaved. *h.* 3ft. to 4ft. Europe, 1793. (F. D. 26.)

P. spicata (spicate-flowered). *fl.* purple, disposed in a dense, elongated spike; galea of corolla straight, obtuse. June. *l.* four (or sometimes five) in a whorl, pinnatifid, with obtuse segments, the uppermost ones often quite entire. *h.* 1ft. Dahuria, 1827.

P. sylvatica (sylvan). Red Rattle. *fl.* rose-colour, loosely spicate; corolla 1in. long, with a slender tube. April to July. *l.* much as in *P. palustris*, but having the segments acute. Stems many, 3in. to 10in. long, decumbent, and ascending from a very short root-stock, leafy. Europe (Britain). (F. D. 225; Sy. En. B. 997.)

P. versicolor (various-coloured). *fl.* parti-coloured, red and yellow, or pure yellow, disposed in an oblong spike; galea straight, obtuse, angular in front, with the apex reflexed. June to August. *l.* pinnate; segments or leaflets imbricated backwards, serrated. Root fasciculately tuberous. *h.* 6in. to 12in. Siberia, 1819.

P. verticillata (whorled).* *fl.* rose-colour or white, pedicellate; galea of corolla straight, toothless and beardless; spikes dense, or interrupted at the base. May and June. *l.* pinnate or pinnatifid, with oblong or ovate, obtuse, toothed segments. Stem erect, nearly simple. *h.* 6in. to 12in. Europe, 1790.

PEDILANTHUS (from *pedilon*, a shoe, and *anthos*, a flower; alluding to the shape of the blossoms). Slipper Spurs. SYN. *Crepidaria.* ORD. *Euphorbiaceæ.* A genus comprising about fifteen species of stove shrubs, often with fleshy branches, natives of tropical America, from Brazil to Mexico and the West Indies. Involucres green or coloured, irregular, oblique, disposed in terminal or axillary, dichotomous cymes; male flowers several, females one, to an involucre. Cauline leaves alternate, entire; floral ones frequently opposite. *P. tithymaloides*, which is probably the only species introduced, is a shrub of a succulent nature. It thrives in a thoroughly well-drained, sandy loam, with the addition of a little well-rotted cow-dung. Propagation may be effected by cuttings, thoroughly dried at the base, inserted in sand, and occasionally very slightly moistened.

P. tithymaloides (Tithymalus-like). Jew-bush. *fl.* disposed in rather dense, terminal cymes; involucre purple, nearly ¼in. long. Summer. *l.* 1in. to 3in. long, sub-sessile, cuneate at base, ovate or oblong, acute, often recurved at apex, the margins slightly undulated; cauline ones ovate, long-acuminate. *h.* 4ft. to 6ft. West Indies, 1874. (B. R. 837; B. M. 2514, under name of *Euphorbia carinata*; L. B. C. 727, under name of *E. canaliculata.*)

PEDILEA. A synonym of **Microstylis** (which *see*).

PEDILONIA. A synonym of **Wachendorfia** (which *see*).

PEDILONUM. A synonym of *Dendrobium.*

PEDROSIA. Included under **Lotus** (which *see*).

PEDUNCLE. A flower-stalk, whether supporting a cluster of flowers or only a single one.

PEEPUL-TREE. *See* **Ficus religiosa.**

PEGANUM (the old Greek name, used by Theophrastus, for Rue, which the plants resemble). ORD. *Rutaceæ.* A small genus (four species) of hardy, perennial, branched herbs. One is broadly dispersed over the Mediterranean region and the warmer parts of Asia, and the rest are found in Central and Eastern Asia and Mexico. Flowers white, rather large; sepals four or five, narrow, often leafy and pinnatifid; petals four or five, spreading, entire; peduncles one-flowered, opposite the leaves, sub-terminal. Leaves alternate, entire or irregularly multifid, not dotted. *P. Harmala* may occasionally be met with in English gardens. It thrives in any light soil, and may be multiplied by divisions of the root.

P. Harmala (from the Arabic name). *fl.* green-veined, with entire calyces. July and August. *l.* multifid into linear lobes. Root woody. *h.* 1ft. Europe, 1570. (S. F. G. 456.)

PEG-WOOD. A name applied to *Cornus sanguinea* and *Euonymus europæus.*

PEIRESCIA. A synonym of **Pereskia** (which *see*).

PELARGONIUM (from *pelargos*, a stork; in allusion to the beak of the fruit, which resembles a stork's bill—at least, as much as the Geranium does that of a crane). Stork's Bill. Including *Campylia, Ciconium, Grenvillea, Hoarea, Jenkinsonia, Otidia, Phymatanthus,* and *Seymouria.* ORD. *Geraniaceæ.* An extensive genus (about 170 species have been described) of, for the most part, greenhouse, glabrous or pubescent, perennial herbs, shrubs, or sub-shrubs, of variable habit, natives, for the most part, of the Cape of Good Hope. Flowers irregular; sepals five, imbricate, connate at base, the upper segment having a spur which is adnate to the pedicel; corolla of five petals (sometimes four or two); peduncles axillary, opposite the leaves, umbellately two to many-flowered, or rarely one-flowered. Leaves opposite or rarely alternate, entire, dentate, lobed, or variously divided, stipular. But few of the species are now in general cultivation, having been, to a great extent, superseded by the numerous handsome hybrid forms. Except where otherwise stated, the species described are South African, and require greenhouse treatment.

It would be difficult to name a more popular plant for gardens of every description than the Pelargonium. The several sections into which the varieties are divided owe their origin principally to hybridising and cross-breeding some of the species indigenous to the Cape; and few, if any, subjects that have ever been taken in hand have so richly and liberally rewarded the hybridist's labour. Throughout the whole year, the Zonal section plays a most important part in furnishing cut flowers, and also decorative plants, for greenhouse, room, and window embellishment; in summer, this section is invaluable for bedding, and is largely represented in the flower garden, though not to the extent, in many places, that it was a few years since. Show, Decorative, and Fancy Pelargoniums are exceedingly floriferous and showy, their flowering season being spring and early summer. The Ivy-leaved sorts form an important and very useful section; many are of trailing habit, and may be used for vases, &c., with good effect. A collection of Cape species and hybrids is far too rarely seen, as the flowers of many, although small, are beautifully and delicately marked, and the habit of the plants is generally very compact. Wherever Pelargoniums for greenhouse decoration are grown, a selection from the species and hybrids should be included. Their leaves are frequently sweet-scented, and useful for mixing with flowers of many other genera; and the plants, when blossoming, afford much more than ordinary interest.

PROPAGATION. Pelargoniums of every description are readily raised from seeds, and the natural habit of the species and single-flowered varieties is generally that of bearing seeds somewhat freely. The seed vessels should be collected just before they burst, and put into a paper bag to ripen. Some cultivators sow at once, but the

Pelargonium—*continued.*

better plan is to preserve until spring, and sow thinly in pans of light, sifted soil, covering to a depth of ¼in. If placed in a gentle heat, the seeds will soon germinate, and the young plants may be grown on under similar treatment to those previously established. They should be placed in pots not larger than 5in. until after they have flowered; any worthless ones should not be retained beyond this stage. In selecting plants from any section with a view to procuring seeds for raising new varieties, it is most important that only those which are very choice should be retained, the standard of excellence being already so high. There is, however, apparently still much room for improvement in one or another essential; and, with such a popular flower, that has already been so vastly improved by hybridising, selection, and seed raising, the work will probably continue to be pursued, and unlooked-for results may, and doubtless will, yet be obtained. The most general method of Pelargonium propagation adopted is that of cuttings, made either from the shoots, or from the roots. Cuttings from tolerably firm shoots will root easily, at almost any time of year, provided they are in a proper state, and placed under suitable conditions. Spring, and the latter part of summer, are the best seasons; and these are most convenient for raising or renewing a stock of plants. The species and hybrids are readily increased by cuttings, made from some of the strongest roots. They should be cut into lengths of 1in. or 2in., inserted in sand, so that the tops show just above the surface, and placed in a temperature of about 60deg. But little water must be given until some leaves are formed, when the young plants may be potted off singly, and grown on in a cooler temperature.

CULTIVATION. It will be most convenient, in referring to cultural details, to deal with the several sections separately, as, although all will succeed under treatment differing but little in many respects, the purposes for which the plants are required, and their seasons of flowering, vary considerably. The principal sections of Pelargoniums, apart from species and their hybrids, are the Show, Decorative, Fancy, Zonal or Bedding, Variegated-leaved, and Ivy-leaved.

Species and Hybrids. Many of these may be propagated by all of the methods to which reference has been made. They are mostly slender-growing plants, and do not require very much root-space, 5in. or 6in. pots being sufficiently large for growing good-sized specimens. Any that are found to be of an evergreen nature should not be kept quite dry in winter, but should be treated as recommended below for the large-flowered Show section; the tuberous-rooted species, and those with succulent stems, require no water all the winter. In early spring, all should be introduced to a little warmth, and gradually watered, when growth will commence for the season, and a house or pit, where plenty of air is admitted, will be the most suitable position. Turfy loam, with a little leaf mould or decayed manure, and some charcoal or sand added, will be the best compost; the pots should be well drained, and the soil rendered tolerably firm. Full exposure to sun and air after flowering will be an essential, in order to thoroughly ripen the wood for the following year.

Show and Decorative Pelargoniums. Large-flowered Show Pelargoniums represent a very extensive and important class of plants, useful for greenhouse decoration, and specially adapted for exhibition as specimens. Decorative sorts are, as their name indicates, more especially suited for ornamentation; their flowers are not so evenly formed, but they are produced in the greatest profusion; the habit is also extremely sturdy and compact. Cuttings should be procured, early in August, from the ripened shoots of plants that have been exposed to the sun until the current year's wood has become hardened.

Pelargonium—*continued.*

Every two firm joints, or even one, will, if required, form a short cutting, which, under proper treatment, will be almost certain to grow. Insert them, about 2in. apart, in pots or pans of sandy soil, and place in an ordinary frame, fully exposed to sun. When rooted, pot off singly, in about 3in. pots, and press or ram the soil quite firm; give only a little water, and return the plants to a close frame or house until re-established. If the points are soon afterwards pinched out, three or four new shoots will form, and these should be tied down, when large enough to handle, close on the rim of the pot. Keep near the glass, in a cool house, and apply sufficient fire-heat to maintain a night temperature of about 45deg.; anything above freezing point will, however, suffice in very severe weather. About December, the final potting may be given, and if the plants are wanted in flower early, they should receive no further stopping; if late, pinch the points out again about the middle of January. Grow on near the glass, in a light, airy structure, and, when the flower-trusses appear, give some weak liquid manure. Show Pelargoniums require good drainage, and should be kept rather dry than otherwise, particularly in autumn and winter, when progress in growth is but slow. Good fibrous loam, torn up by hand, with about one-fourth decayed manure or dried cow-dung added, and sufficient sand to keep the whole open, will form an excellent compost. It is important that the soil should be rendered firm in potting; otherwise, the shoots are inclined to become sappy, and lengthen more than is desirable. A good plan is that of preparing the compost some time beforehand, and thoroughly mixing it occasionally.

When the plants are flowering, they should be shaded from sunshine, and be placed where plenty of air can be admitted; they are at all times most impatient of a close atmosphere. Decorative varieties are now very popular, and are extensively grown, because of their early flowering and compact habit. Young plants of these should not be stopped more than once; they should receive their final potting earlier, and be kept rather warmer in winter, than others which are intended for flowering later in spring. When the season of each is over, and the plants are removed from under glass, they should be placed out of doors, in full sunshine, for about a month, when they may be cut back, and again started into growth.

Large specimen Pelargoniums are obtained by growing plants for several years. They may receive the treatment already described for the first season. After being cut back, about August, they should be kept syringed, and moderately moist at the root, until beginning to break, when they should be shaken out, the roots partially pruned, and replaced, with new soil, in pots a size smaller than before. Grow on in a similar way to young plants, and transfer, about the end of the year, to the flowering pots, which, for very large plants, need not exceed 8in. or 9in. in diameter. Timely attention must be given to training and tying the growths, in order to equalise and balance the head. When grown in 5in. or 6in. pots, for ordinary decoration, a piece of matting may be tied round, beneath the rim; to this, other pieces may be temporarily attached for tying out the shoots. As the wood solidifies, it will usually remain in the position in which it has been placed, and the ties may be removed. Thus, established plants may be grown several years in pots of a similar size, the soil being annually renewed, and due attention given to feeding with manure water, or artificial manure, at the time the flowers are being formed, and when they are expanding.

Fancy Pelargoniums. These form a class of plants with an exceedingly compact habit; their flowers, though small, are prettily marked, and borne in the greatest profusion. They are tenderer than the large-flowered

Pelargonium—*continued.*

Show varieties, and are not quite so easily grown. Instead of propagating from ripened wood in autumn, early spring is found the best time, and new shoots are taken for the purpose of forming cuttings when they become tolerably firm. The general treatment regarding soil, potting, ripening in summer, &c., given above for the Show section, will also suit this, with the following exceptions: Watering must be even more carefully attended to in winter; a little higher temperature is also desirable, and over-potting must specially be avoided. It is better to err in keeping the roots somewhat dry rather than too wet. Plenty of room must be allowed each plant, or it will soon become drawn; light and air, whenever the latter can be admitted, are also essentials to success. Fancy Pelargoniums are much less vigorous than the Show varieties, and do not require so much tying out; yet sufficient should be done to them in this respect to prevent the numerous shoots overcrowding each other in the centre. The plants may be similarly grown on for several years in succession; but it is advisable to propagate new ones, to gradually replace the old ones.

Zonal or Bedding Pelargoniums. Amongst popular garden plants, few are more widely cultivated than the varieties of Zonal Pelargoniums. They are supposed to have originally descended from *P. inquinans* and *P. zonale*, which were introduced early in the eighteenth century. Varieties of the present day show a remarkable contrast in comparison with them, and the vast improvement in the flower and habit of the plant which has been made, more particularly of late years. Zonal Pelargoniums may be had in flower the whole year round, by affording some little attention to the propagation and preparation of plants. Many of the varieties raised somewhat recently are exceedingly showy decorative subjects when grown in pots under glass, and they are more especially useful throughout the winter for the purpose of cutting. With this latter object in view, cuttings should be inserted in the previous autumn, or early in spring, and the plants obtained should be grown on throughout the summer, and not allowed to flower until, say, about September, when the season for those outside will begin to decline. A light, airy house or pit, with a warm, fairly dry atmosphere, will be the best situation from the time the plants are rooted until about midsummer, when they should be placed on a bed of coal ashes in the open air, or in a shallow pit with the sashes removed. This plan is adopted in order that the growths may be short-jointed and become well ripened by autumn. During winter, a light span-roofed house is best adapted for Zonal Pelargoniums in flower; it should be kept at from about 50deg. to 55deg. by day, and the atmosphere always on the dry side. An excellent and a most successful system of heating houses for the winter treatment of Zonal Pelargoniums in flower, is that of conducting the hot water through a small pipe fixed along the rafters, just above the flower trusses. This plan is not always practicable, or, perhaps, worth the trouble of adopting where only a comparatively few plants are grown; but the success attending it is suggestive as to what are the most suitable provisions to be aimed at under ordinary circumstances. Damp is the greatest enemy to be contended with in winter. In summer, either young or old plants may readily be had in flower at almost any time by leaving their trusses to expand. Young plants should be stopped once or twice, to encourage a compact habit, care being taken always to pinch to a joint at which is situated a growing bud. A system frequently—indeed, generally—practised is that of stopping indiscriminately at whatever joint seems best situated; this should not be adhered to with the Pelargonium unless where there is a growth or wood-bud present, and not a flower-truss. Cuttings that are not too sappy will root with the greatest ease in a warm house or pit during spring, and at almost any season, if young plants are required. The plants succeed best in a rich, loamy soil, with some manure; and they flower most profusely if allowed to become somewhat pot-bound, and fed with liquid manure.

Pelargonium—*continued.*

Unfortunately, none of the single Pelargoniums are lasting in a cut state, as their petals drop readily. To prevent this with plants for exhibition, and with flower-trusses for market, it is customary to drop the smallest quantity of liquid gum into the centre of each flower, to render it more durable. Varieties with double or semi-double flowers have now become numerous, and are exceedingly useful in a cut state, as, unlike the single ones, they hold on persistently until becoming withered. The plants succeed under treatment similar to those which have single flowers, and are very compact and floriferous, especially the semi-double varieties, that are of a comparatively recent date, and mostly of Continental origin. It must be admitted they are not so showy as varieties with single flowers, but, notwithstanding this, they form a very attractive and useful addition.

Zonal Pelargoniums, used only for bedding, in summer, may be propagated in any quantity towards the end of August, by cuttings obtained from plants outside. These may be inserted rather close together, in either pots or boxes, as may be convenient, and placed on a bed of ashes, in the full sun. Here they may remain until housed up for the winter, about the end of September, in any structure kept a little warm and rather dry. Any dead leaves should be frequently looked for and removed, and but little water should be given. Pot off singly about February, and grow on, in preparation for transplanting outside, in May, or early in June.

Variegated-leaved Pelargoniums. A few varieties of these are invaluable as bedding plants, on account of their coloured foliage and distinct appearance in comparison with the ordinary Zonals. They are severally distinguished as Golden Tricolor, Silver Tricolor, Gold and Bronze or Bicolor, Silver-variegated, Golden-leaved, and Variegated Ivy-leaved. Tricolors, with few exceptions, are rather tender, and do not succeed properly in the open ground, unless under favourable conditions, and in a warm situation. They may be grown well in small pots, under glass. Cuttings from outside should be inserted in pots, early in August, and a warm, rather dry, place selected for them in winter. They may also be readily propagated in heat during spring. The Bronze, Silver-variegated, and Golden-leaved varieties are almost exclusively used for bedding, and may be treated in the same manner as recommended for bedding Zonals. In summer propagating, however, they should be attended to first of the two; and a little heat will be necessary all winter, to preserve the leaves from damping. Variegated Ivy-leaved Pelargoniums are only few in number; being of trailing habit, they are very useful for vases, hanging baskets, &c.

Ivy-leaved Pelargoniums. These have now become a very important class, by the addition of numerous varieties with semi-double flowers. They are more especially adapted for pot culture and greenhouse embellishment than for other purposes, and are most valuable in summer and autumn, when it is desirable that plants under glass should be different from those so plentiful outside, or superior, in point of perfection, if they are varieties of the same thing. Several of the single-flowered trailing sorts are well adapted for hanging over vases, &c., in summer; and such may also be grown in pots, and trained on pyramidal or balloon-shaped trellises. Ivy-leaved Pelargoniums are readily increased from cuttings, which may be inserted at any time when the plants are growing. They should be grown on throughout the summer, and be allowed to rest in a cool place all

Pelargonium—*continued.*

winter. Attend to repotting and tying those large enough for flowering early in spring, and provide them with a light house or pit, with a temperature of about 55deg. Here they will soon grow rapidly, and timely attention must be given to tying the new growths to cover their trellis. Some of the sorts are not trailers; the habit will, of course, distinguish between them at once. Ivy-leaved Pelargoniums are much benefited by frequent syringings up to the time they come into flower; they also require plenty of water at the root.

INSECTS. Pelargoniums are not much injured by insects, with the exception of Aphides, particularly Green Fly. These invariably affect all the sections more or less, though not the Zonals, and those allied to them, so much as the others. Fumigating is the best remedy; it should be practised rather frequently in spring, for prevention as well as cure. It is specially important that the plants should be free from insects at the time they come into blossom, as many of the flowers would be destroyed by measures being afterwards taken to effect an eradication.

P. abrotanifolium (Southernwood-leaved).* *fl.* white or rosy, the two broader upper petals having a red spot; calyx tube much longer than the pedicels. May. *l.* powdery, fan-shaped, three-parted; lateral segments deeply two or three-lobed; terminal one multifid, with linear, channelled, blunt lobes. *h.* 3ft. 1791. A slender, canescent shrub. (Sw. Ger. 351.)

P. angulosum (angular). *fl.* purple, with dark streaks, panicled; pedicels and calyces densely hairy and rough; petals twice as long as the acuminate sepals. Summer. *l.* shortly stalked, truncate or broadly-cuneate at base, with three to five shallow, angular, acute, toothed lobes. 1724. A large bush. From this species, *P. cucullatum*, and *P. grandiflorum*, have originated those races of garden plants known as Show, Decorative, and Fancy Pelargoniums.

P. apiifolium (Parsley-leaved). *fl.* sub-sessile; calyx tube three or four times longer than the reflexed segments; petals dark, with a pale border, obovate, reflexed. June. *l.* pinnati-partite, pinnæ petiolate, pinnatifid-pinnate; segments cuneate, flat, laciniate, glabrous and glaucous. Stem thick and fleshy; flowering branches slender, herbaceous. 1800.

P. ardens (glowing).* *fl.* bright scarlet, shaded with a darker colour; umbels many-flowered. Summer. *l.* hairy, cordate at base, oblong, unequally lobed, sometimes ternate. Stem thick, suffruticose. *h.* 1ft. to 1½ft. This very fine garden plant is a hybrid between *P. fulgidum* and *P. lobatum*. (L. B. C. 139; Sw. Ger. 4.)

P. betulinum (Birch-like).* *fl.* purple, with dark streaks; pedicels and calyx silky; petals twice as long as the sepals; peduncles deflexed, three or four-flowered. July. *l.* seldom 1in. long, shortly petiolate, oval or ovate, obtuse, unequally toothed, sub-glabrous or scaberulous. *h.* 3ft. 1759. A rather slender, erect shrub. (B. M. 148.)

P. bicolor (two-coloured).* *fl.* nearly sessile; calyx segments reflexed; petals purple, with a pale border, obovate. July. *l.* on long petioles, cordate at base, pinnatifidly lobed, 3in. to 4in. long, and nearly as broad, softly pubescent, margins dentate; lateral segments broadly cuneate, bilobed and cut, the terminal one trifid and toothed. Stems shrubby, succulent, sparingly branched. *h.* 1ft. to 2ft. 1778. (B. M. 201; Sw. Ger. 97.)

P. Bowkeri (Bowker's).* *fl.*, calyx tube 1½in. long; petals bipartite, eight to ten lines long, purple at base, with yellow, capillary, fringe-like lobules; umbel many-flowered; scape 12in. to 14in. high. Summer. *l.*, radical ones on petioles 5in. to 6in. long, decompound, linear-lanceolate, 5in. to 6in. long, each segment as finely divided as a Fennel-leaf. Stem short and succulent. 1864. Herb. (B. M. 5421.)

P. capitatum (capitate). *fl.* rosy-purple, in dense, many-flowered heads. Summer. *l.* long-stalked, cordate, three to five-lobed; lobes obtuse and rounded, toothed. 1790. A shrub with branches, in a wild state, generally trailing on the ground. This species is largely cultivated in the Mediterranean region for an essential oil distilled from the leaves, which is used as a perfume, and also for adulterating otto of roses. Probably, *P. capitatum* is one of the parents of the garden hybrid ROLLISSON'S UNIQUE, a handsome, free-flowering plant, with purplish-crimson flowers.

P. carnosum (fleshy). *fl.* generally white, small, on long, branched peduncles; pedicels patently setose; umbel many-flowered, with short bracts. May. *l.* 2in. to 4in. long, shortly petiolate, oblong, deeply pinnatifid, somewhat fleshy, cut nearly to the midrib; segments flat, sharply cut or pinnatifid. Stem 1ft. to 2ft. high, succulent, clumsy, not much branched. 1724. (Sw. Ger. 98.)

P. comptum (decked).* *fl.* many in an umbel; calyx villous; petals nearly obcordate, the upper ones larger, bright pink, lighter at the base, and with a dark purple spot in the centre, and numerous stripes below it, the lower ones darker. Summer and autumn.

Pelargonium—*continued.*

l. kidney-shaped, rounded, slightly lobed, unequally and rather deeply notched; petioles slender. Stem erect, branched, shrubby, succulent. Hybrid. (Sw. Ger. 255.)

P. cordatum (cordate-leaved). *fl.* purple, white; calyx and pedicels generally densely villous; petals twice as long as the sepals; peduncles branched or panicled, the partial ones short and many-flowered. May. *l.* long-petiolate, cordate, acute, denticulate, and sometimes repand-lobulate; stipules subulate from a broad base. *h.* 3ft. 1774. An erect, much-branched, villous or sub-glabrous shrub. (B. M. 165 under name of *P. cordifolium.*)

FIG. 63. PELARGONIUM ENDLICHERIANUM.

P. crispum (curled-leaved).* *fl.* purple; sepals oblong, acuminate; petals narrow; peduncles short, two or three-flowered. September. *l.* ½in. to 1½in. long, distichous, shortly petiolate, fan-shaped, truncate or cuneate at base, trilobulate or deeply three-lobed, coarsely toothed, rigid and rough, curled, strongly scented. *h.* 3ft. 1774. A slender, much-branched shrub. (Sw. Ger. 383.)

P. cucullatum (hooded-leaved). *fl.* purple; petals twice as long as the lanceolate-acuminate sepals; pedicels and calyx silky. Summer. *l.* long-stalked, reniform-cupped, denticulate, very soft. 1690. This species is the parent of a large number of garden hybrids: some of the double forms are very pretty.

P. denticulatum (toothed). *fl.* lilac or rosy-purple; upper petals emarginate or bifid. Summer. *l.* long-stalked palmati-partite, glabrous and viscid above, hispid beneath; lobes simple or pinnatifid, linear, flat, coarsely toothed. 1789. A slender, half-herbaceous species. (Sw. Ger. 109.)

P. echinatum (bristly).* *fl.* mostly white, with a dark red spot on the upper petals, but sometimes deep purple; petals emarginate; pedicels very short; partial peduncles six to eight-flowered. June. *l.* long-petiolate, cordate-ovate, obtuse, somewhat three, five, or seven-lobed; lobes rounded, crenulate or bicrenulate, pubescent above, white-tomentose beneath. Stem fleshy, armed with persistent, spine-like stipules. *h.* 1ft. 1789. Shrub. (B. M. 309; Sw. Ger. 54.)

Pelargonium—*continued.*

P. Endlicherianum (Endlicher's).* *fl.* deep rose-coloured, large; sepals spreading; two larger petals marked with five deep purple nerves; peduncles long, terminal; umbel terminal, many-flowered. July. *l.* few; radical ones long-petiolate; cauline ones on shorter stalks; all cordate, plicate, with a deep sinus, obscurely five-lobed. Stems simple, erect, herbaceous. Rootstock large. *h.* 2ft. Taurus, 1855. Nearly hardy. See Fig. 63. (B. M. 4946; F. d. S. 2031; R. G. 311.)

FIG. 64. FLOWERING BRANCH OF PELARGONIUM INQUINANS.

P. fissum (cleft).* *fl.* pale pink, not dotted or streaked; petals sub-equal, exceeding the calyx. Summer. *l.* roundish-reniform, with toothed lobes, hairy when young. *h.* 1ft. Herbaceous. (Ref. B. 149.)

P. fragrans (fragrant), of Sweet.* Nutmeg-scented Geranium. *fl.* white, marked with red lines on the upper petals; upper calyx segment erect, the others reflexed; two upper petals ligulate, slightly emarginate, the lower ones obovate or broadly spathulate. Summer. *l.* roundly cordate, generally three-lobed, bluntly toothed or crenate, strongly veined beneath, densely pubescent. Stem shrubby, erect, much-branched; branches spreading. *h.* 2ft. Hybrid. (Sw. Ger. 172.)

P. gibbosum (swollen). Gouty Geranium. *fl.* greenish-yellow, on very short pedicels; calyx segments villous, pubescent; petals obovate. June. *l.* glaucous and nearly glabrous, pinnatipartite; segments one or two pairs, with a terminal one, the lowest petiolate, all broadly cuneate, cut or lobed; stipules small. Stem shrubby, succulent, much swollen at the distant nodes. *h.* 1½ft. 1712. (Sw. Ger. 61.)

P. glaucifolium (Horned Poppy-leaved).* *fl.* very dark, velvety, blackish-purple, edged with greenish-yellow, exquisitely fragrant; calyx segments obtuse; petals all obovate, the two upper ones rather larger. Summer. *l.* variable in form, ternate, pinnatifid, lobed, or sinuated, densely woolly beneath. Stem suffruticose, slightly branched. Root tuberous. Hybrid between *P. gibbosum* and *P. lobatum*. (Sw. Ger. 179.)

P. grandiflorum (large-flowered). *fl.* large; petals nearly three times longer than the calyx, two upper obovate, white, marked with red branching lines at the base, lower ones broadly spathulate, white. *l.* long-stalked, palmately five to seven-nerved, deeply five to seven-lobed. 1794. Supposed to be one of the parents from which have originated the Show and Fancy Pelargoniums of florists. (A. B. R. 12; Sw. Ger. 29.)

P. heracleifolium (Heracleum-leaved). *fl.* greenish-yellow; calyx segments pubescent, half as long as the obovate petals;

Pelargonium—*continued.*

umbel ten to twelve-flowered. July. *l.* rather thick, softly villous above, tomentose beneath, oblong, deeply incised-pinnatifid or somewhat pinnate, serrated, the terminal segment very large. Stem short and deflexed, herbaceous. *h.* 6in. 1800. (L. B. C. 437; Sw. Ger. 211.)

P. hirsutum melananthum (hairy, black-flowered). *fl.* blackish-purple; calyx softly pubescent, the sepals with membranous margins; umbels many-flowered. Summer. *l.* stalked, very variable, simple, pinnatifid, bipinnatifid, or almost pinnatipartite. *h.* 6in. to 12in. Herbaceous. (Sw. Ger. 73.) SYNS. *Hoarea atra* (Sw. Ger. 72), *H. melanantha.*

P. hybridum (hybrid). *fl.* pale scarlet; calyx segments spreading; petals five, or sometimes six, wedge-shaped, the two uppermost ones smallest, and converging at base. September. *l.* roundish-reniform, truncate at base, slightly lobed, unequally notched; petioles hairy. Stem shrubby, much-branched; branches short. *h.* 2ft. 1732. (Sw. Ger. 63.)

P. ignescens (fiery-flowered).* *fl.* scarlet; nectariferous tube twice as long as the calyx; two upper petals obovate, the three lower ones ligulate. Summer. *l.* cordate, deeply three-lobed, in some cases nearly to the base; the side lobes slightly bilobed, the intermediate one trilobed. Stem shrubby, with a few succulent branches. *h.* 1½ft. 1812. Hybrid. (L. B. C. 109; Sw. Ger. 2.)

P. inquinans (stained-flowered).* *fl.* varying from intense scarlet to rose-colour and white; petals broadly obovate; pedicels very short; peduncles long, many-flowered. July. *l.* shortly petiolate, orbicular-reniform, velvety, and somewhat viscous-pubescent, crenate, almost undivided or obsoletely multi-lobulate. Younger branches succulent, velvety. *h.* 2ft. 1714. This shrub is the parent of most of the so-called "Scarlet Geraniums" of our gardens. It lacks the horseshoe mark of *P. zonale*, and has broader and shorter petals. See Fig. 64.

P. millefoliatum (Milfoil-leaved). A synonym of *P. triste.*

P. oblongatum (oblong).* *fl.* cream-coloured, marked on the upper petals with purple veins; calyx tube and stamens very long; petals broadly obovate; umbels many-flowered. Summer. *l.* glabrous, fleshy, on long or short petioles, broadly ovate, obtuse or sub-acute, pale green, paler below; margins lobulate and obscurely irregularly toothed, sometimes multifid. Root tuberous. *h.* 6in. 1872. (B. M. 5896.

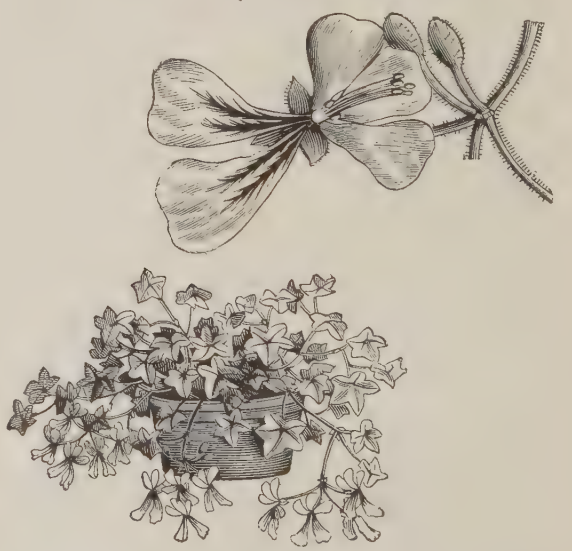


FIG. 65. PELARGONIUM PELTATUM, showing Habit and portion of detached Umbel.

P. peltatum (peltate-leaved).* Ivy-leaved Pelargonium. *fl.* varying from white to red, large or small; petals twice as long as the calyx; peduncles elongated, four to eight-flowered. July. *l.* glabrous or pubescent, fleshy, peltate, radiately five-nerved below, bluntly five-angled or lobed, with very entire margins. Stem shrubby; branches angular, weak and straggling. *h.* 2ft. 1701. See Fig. 65. (B. M. 20; Sw. Ger. 95.)

P. pulchellum (pretty).* *fl.* umbellate, outer ones pedicellate, inner ones sub-sessile; petals white, each with a large, deep red spot; scapes branched, pilose. April. *l.* on short, hairy petioles, oblong, silky, incised-pinnatifid; lobes oblong, acute; stipules broadly ear-shaped, rigid. Stem short and succulent, scarcely branched, sometimes obsolete. 1795. (B. M. 524; Sw. Ger. 31.)

P. quercifolium (Oak-leaved).* Oak-leaf Geranium. *fl.* purple or pink, shortly pedicellate; sepals elliptic, mucronate, half as

Pelargonium—*continued.*

long as the petals; peduncles deflexed, three to five-flowered. May. *l.* shortly petiolate, cordate at base, sinuato-pinnatifid, hairy, strongly scented; lobes and sinuses rounded; margins wavy and crenated. Stem much-branched. *h.* 3ft. 1774. A well-known shrub.

P. Radula (Radula).* *fl.* pale purple, with dark streaks, small, pedicellate; calyx densely setose and glandular, the tube short; peduncles short, hispid, four or five-flowered. June. *l.* on rather long petioles, palmati-partite, roughly hispid above, softly pubescent beneath; lobes narrow-linear, pinnatifid, with revolute margins. *h.* 3ft. 1774. A much-branched, balsamic-scented shrub.

P. sanguineum (bloody). *fl.* scarlet, pedicellate; calyx tube long or short, with reflexed segments; petals narrow-obovate. July. *l.* pinnati-partite, glabrous, rather thick; pinnæ sessile, decurrent, laciniately pinnatifid, with obtuse lobes. Stem shrubby, fleshy, nodose, glabrous; flowering branches herbaceous. *h.* 1ft. Probably a hybrid. (Sw. Ger. 76.)

P. schizopetalum (cut-petaled). *fl.*, petals five, nearly equal, two-parted, the divisions multifidly laciniate, or divided into numerous branching segments, the two upper ones pale yellow, the lower ones brownish-purple; umbel several-flowered, spreading. Summer. *l.* about 6in. long, ternate or deeply trifid, obtuse, oblong-oval, undulate, hairy on both sides, unequally round-toothed; terminal leaflet very large, eleven to thirteen-lobed. Stem short, suffruticose, rather succulent. Root tuberous. *h.* 1ft. 1821. (Sw. Ger. 232.)

P. Schottii (Schott's).* *fl.* 1½in. to 1½in. in diameter; calyx tube 1in. long; petals crimson, with black, elongated, broken blotches running into the nerves on the disk; umbel six to ten-flowered; peduncle 4in. to 10in. long, simple or branched. *l.* scattered, on petioles 4in. to 10in. long, pinnately three to seven-foliolate; lobes or pinnules all much cut and lobulate, with waved and crisped, toothed margins. Stem succulent, branched, 1ft. to 1½ft. high, somewhat shrubby at base. Plant hairy. Garden hybrid. (B. M. 5777.)

FIG. 66. INFLORESCENCE AND LEAF OF PELARGONIUM TRICOLOR.

P. tricolor (three-coloured).* *fl.* on long pedicels; sepals villous; two upper petals generally very dark red, the three lower ones white, but sometimes the upper ones are coloured at the base only, where there is always a darker spot; partial peduncles two or three-flowered. July. *l.* on long, slender petioles, villous-canescent, lanceolate or oblong, incised-toothed or lobed. Stem shrubby, short, branching, diffuse. *h.* 1½ft. 1791. See Fig. 66. (B. M. 240; Sw. Ger. 43.)

P. triste (dull-flowered). *fl.* dull brownish-yellow, with dark spots, or partly dark-brown, with a pale border, very sweetly aromatic at night; petals twice as long as the calyx segments; peduncles long; umbel many-flowered. July. *l.* 8in. to 12in. long; radical and lower ones bi-tripinnately decompound; segments decurrent, toothed and laciniated, the teeth gland-tipped. Stem short or scarcely any, deflexed, succulent. 1632. Herb. (B. M. 1641.) SYN. *P. millefoliatum* (Sw. Ger. 230).

P. t. filipendulifolium (Dropwort-leaved). *l.* sub-bipinnatifid; segments broader than in the type. Plant caulescent. (Sw. Ger. 85, under name of *P. filipendulifolium.*)

P. vitifolium (Vine-leaved). *fl.* purple, small, sessile, in densely many-flowered heads; petals short. July. *l.* on long petioles, cordate at base, three-lobed; lobes shallow, very obtuse and rounded, toothed; stipules broadly cordate. *h.* 1½ft. 1724. Plant suffruticose, erect, densely hairy and villous.

P. zonale (zonal). "Horseshoe Geranium." *fl.* varying from scarlet and crimson through all shades of red to pure white, subsessile; calyx tube four or five times longer than the segments; petals narrow-cuneate or spathulate; peduncles long, many-

Pelargonium—*continued.*

flowered. August. *l.* on long petioles, roundish-cordate, glabrous or pubescent, mostly with a dark horseshoe mark above (whence the common name), crenate-toothed, obsoletely many-lobed. Younger branches succulent. *h.* 2ft. 1710. A well-known shrub. See Fig. 67. *P. stenopetalum* is a variety with very narrow-

FIG. 67. FLOWERING BRANCH OF PELARGONIUM ZONALE.

linear petals. Of *P. zonale* there are innumerable garden forms, of which a selection is subjoined. Now and then, seedlings develop only proliferous flowers, like those shown in Fig. 68.

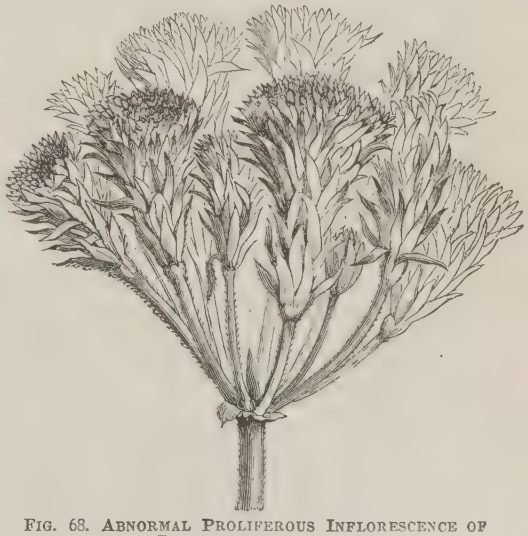


FIG. 68. ABNORMAL PROLIFEROUS INFLORESCENCE OF PELARGONIUM ZONALE.

VARIETIES. Pelargoniums are exceedingly numerous in varieties, a circumstance not to be wondered at when it is remembered how readily seedlings may be raised, and how successful have been the results attending the hybridising and improvement of these plants as systematically carried out by English and Continental raisers. Subjoined is a selection of varieties representing the several sections that have been referred to in the foregoing cultural instructions. Doubtless, many others

Pelargonium—*continued.*

which have necessarily to be omitted here are equally meritorious with those included; this is unavoidable where there is such a vast quantity to select from, and where only a limited number can be referred to.

Large-flowered Show Pelargoniums.

ADVENTURER, maroon spot, lower petals rose, white centre; fine form. AMBASSADOR, upper petals deep, lower petals rosy-pink, clear white eye. AMETHYST, rich purple, top petals deep maroon; dwarf and free-flowering habit, fine. BEACON, crimson, very free; excellent habit. CHIEF SECRETARY, rosy-crimson, shaded with maroon and orange, white centre; very free and effective. CLARIBEL, pure white, with small, bright carmine spot on top petals; extra good. CONFESSOR, black top, narrow rose margin, lower petals rose, white centre; large and fine. DEMOCRACY, lower petals purple, suffused with lilac, dark upper petals, white centre. DESDEMONA, white; early, very free-flowering. DESPOT, deep crimson, maroon spot on upper petals. DUKE OF CONNAUGHT, crimson-scarlet, suffused with purple. FLORENCE, rich crimson, light centre; very free. FORTITUDE, orange, with black spot on top petals, rose edge, lower petals pink, clear white centre; large and very fine. ILLUMINATOR, bright vermilion-scarlet, rich and glossy, clear white centre; extra fine. INVINCIBLE, rich crimson-maroon top petals, lighter centre; dwarf habit. JOE, upper petals dark maroon, with narrow purple margin, lower rosy-purple, white centre; dwarf and free habit. LORD CLYDE, scarlet, dark maroon blotch on upper petals. MAGNATE, top petals black, narrow fiery edge, white centre, shaded; large and fine. MAID OF HONOUR, pink, small dark maroon blotch on upper petals, large white centre; of great size. MAN-AT-ARMS, rich dark top petals, lower petals shaded crimson; a large flower of fine form; extra. MANDARIN, dark rich crimson, with broad, bright margin; free and dwarf habit. MARGARET, top petals dark maroon, rosy-purple margin, white centre; fine large flower. MARTIAL, deep rich crimson, maroon top, narrow fiery edge; free, robust habit, extra fine. MARY HOYLE, orange-rose, white centre. MONARCH, petals crimson-purple, black top, with crimson edge, white centre. NEGRESS, very dark maroon, pure white eye. OUTLAW, black top petals, narrow margin of bright crimson, white centre; large and fine. PURPLE GEM, deep purple, top petals black maroon, purple margin. PURPUREA, rich purple-edged lilac, clear white centre; good habit. RETREAT, deep rose, maroon spot, white centre; free. ROYAL REVIEW, lower petals richly painted crimson, very dark top petals, narrow crimson edge; dwarf and very free; extra fine. SAPPHO, cherry-rose, suffused purple, small maroon spot on top petals, white centre; dwarf and very floriferous. SCOTTISH CHIEFTAIN, painted crimson, top petals dark maroon. SEYLA, pale rose, maroon top petals, clear white centre. STATESMAN, pale rose, lower petals maroon, top margined with rose, white centre; large. THE BARON, lower petals rosy-crimson, shot with purple, black top petals, white centre; very distinct. THE CZAR, rich deep crimson, of great substance and good quality; free habit. VETERAN, lower petals rose, upper ones maroon, white centre; fine large flower. VIRGIN QUEEN, pure white, with purplish-carmine spots on the top petals; dwarf, sturdy habit.

Decorative Pelargoniums. Spotted, Fringed, and Semi-double.

ANNIE HEMSLEY, bright rosy-crimson, tinted orange, pure white centre and margin, maroon blotch on upper petals; good habit, extra fine. CAPTAIN RAIKES, bright crimson, dark blotch on upper petals; double. CARL KLEIN, orange-scarlet, black spot on each petal, semi-double, beautifully fimbriated. DECORATOR, crimson, with maroon spots; free and effective. DIGBY GRAND, white, with dark blotch on upper petals, heavily fringed. DRESDEN CHINA, white, striped carmine; a great novelty. DR. MASTERS, dark maroon, crimson edges, much fringed. DUCHESS OF BEDFORD, fringed white, carmine spot; very free. DUCHESS OF EDINBURGH, fringed white purple blotch: dwarf free habit. FAIRY QUEEN, pale pink, small spots, very free and effective. GOLD MINE, orange-scarlet, white centre; free and fine. GRAND LILAS, French white, purple spot: free. INTEGRITY, bright scarlet-crimson, small black spot; dwarf, free habit. KINGSTON BEAUTY, white, dark blotch; very free and good. LADY BLANCHE, white, with small crimson spots. LUCIE LEMOINE, pure self-white; novel. MADAME C. KOLNIG, white; free and fine. MADAME THIBAUT, white, richly blotched and marbled with rose, large white centre; petals fimbriated; extra fine. MAID OF KENT, fringed white, rose-coloured spot; free, dwarf habit. MARIE LEMOINE, white, with small purple spots; large, stout flower; dwarf habit. MERMERUS, bright red, maroon spots. MR. ASHBY, dark rose, maroon spot, light centre; dwarf habit. MR. JOHN HAYES, shaded rosy-pink, white edges; free. MRS. ASHBY, rosy-crimson, maroon spot, white centre. PRINCE OF NOVELTIES, crimson and maroon, white margin; semi-double. QUEEN VICTORIA, bright orange-carmine, white edges; semi-double. ROSETTA, purple, maroon spots; very free and effective. ROSY MORN, pink, with carmine spots on all the petals; free and good. TRIOMPHE DE ST. MANDÉ, deep crimson; immense trusses; extra fine. TRIUMPHANS, rich purplish-crimson; dwarf and free; very distinct. VENUS DE MILO, white, semi-double; useful for bouquets. VOLONTÉ NATIONALE, light, with rosy-carmine spots and stripes, fringed.

Pelargonium—*continued.*

Fancy Pelargoniums.

ACME, purple-maroon, white throat and margin; good form and habit. ATLANTIC, rich crimson, suffused with purple. BRIDESMAID, delicate pale lavender, edged white. CLOTH OF SILVER, white, with delicate rose blotch. COUNTESS OF DUDLEY, rosy crimson, light throat, lower petals rose; fine. DUCHESS OF EDINBURGH, white, carmine spot on each petal. EAST LYNNE, crimson-purple; large, good shape. ELLEN BECK, lilac-carmine, bright edges; dwarf, free habit. FANNY GAIR, rosy-lake, suffused with purple, white centre and edges; fine. FORMOSA, lake, shaded lilac, white centre and edges; fine form. GODFREY TURNER, crimson, lower petals light crimson, lilac margin. JANNETTE, rich purple, clear white centre and edges; smooth and free. LADY CARINGTON, soft pale peach, top petals suffused pale pink. LORD OF THE ISLES, deep rosy-purple, white centre and edges. LUCY, crimson-lake, shaded violet; robust habit. MISS GODARD, rich crimson, white centre and edge; smooth and fine form. MISS-IN-HER-TEENS, cerise upper petals, lower petals mottled crimson. MRS. ALFRED WIGAN, pink, clear white centre and edges. MRS. DORLING, mottled lilac, white throat and edges; fine form. MRS. DOUGLAS, rose, suffused purple, light centre and edges. MRS. FOSTER, rosy-purple, light edges and centre; large. MRS. GAIR, crimson-purple, white centre and edges; dwarf habit. MRS. HART, rosy crimson-purple, white margin, clear white eye; fine. MRS. MILNE HOME, rosy-lilac, white centre, narrow white margin; free. PRINCESS TECK, white, with carmine spots; very smooth and floriferous. ROI DES FANTAISIES, rosy-crimson, white centre. ROSY MORN, rose, clear white throat and edges; excellent. SILVER CLOUD, pale pink, large white centre; fine shape and substance. THOMAS KING, carmine, suffused violet, lilac edges, white centre; fine. THURIO, carmine, shaded purple, white centre and edges, smooth finely-formed flower. VICTOR HUGO, crimson, large light centre; free.

Zonal and Nosegay Pelargoniums.

Single-flowered Varieties adapted for Pot Culture. AJAX, reddish-scarlet, good form and size, fine bold trusses. CELIA, rich crimson, broad overlapping petals; attractive. CHARLES SCHWIND, dark crimson, large truss; vigorous habit. COMMANDER-IN-CHIEF, rich scarlet, free-flowering, compact; a fine variety. CONSTANCE, rich rose; very free. DR. ORTON, rich dark crimson, large trusses; compact habit, extra fine. EDITH GEORGE, reddish-pink, trusses very large and globular. EVENING STAR, white, with large pink eye, very compact. FANNY CATLIN, soft rosy-salmon, large white eye, good flower and truss. FERDINAND DE LESSEPS, fine scarlet; dwarf habit. HENRY JACOBY, rich dark crimson, trusses extra fine; dwarf, compact habit. HERMIA, rosy-red, flowers and trusses large; good. HETTIE, rosy-magenta, fine form and substance, compact. IANTHE, crimson-magenta, compact. IMOGEN, soft salmon, well-formed flowers. JEANNE D'ARC, white, good shape. J. MCINTOSH, crimson-scarlet; free, dwarf habit. JOHN GIBBONS, bright orange-scarlet, pips and trusses very large; extra fine. KATE GREENAWAY, rosy-pink, large round flowers; very free. LADY BAILEY, rosy-pink, large truss; fine. LADY CHESTERFIELD, deep salmon, fine form. LADY REED, pure white, with scarlet centre; one of the finest oculated varieties. LENO, magenta; very dwarf and free. LIZZIE BROOKS, salmon-scarlet, fine shape. LORD ROSEBERY, cerise-red. LUCY BOSWORTH, bright rose-pink, with white on upper petals, fine round pips, large truss. M. CHEVREUL, rich magenta, suffused purple; a fine variety. MISS SKIPWORTH, bright pink, white blotch on upper petals. MRS. HUISH, magenta-scarlet, very floriferous; dwarf habit. MRS. JOHNSON, rosy-magenta, pleasing shade; free. MRS. NORRIS, fiery-scarlet; very dwarf and free. MRS. STRUTT, pink, with purple shade, flowers and trusses large, well formed. MRS. WHITELEY, bright scarlet, white eye, of fine form; dwarf habit. NIPHETOS, white; dwarf, and free flowering. NORAH, soft blush, large. PLUTARCH, bright scarlet, small white eye, of great substance and size. QUEEN OF THE BELGIANS, white; compact, floriferous habit; one of the best white varieties. SCARLET CLOTH, rich scarlet, large flowers and trusses. SOPHIE BIRKIN, mottled salmon, large; one of the best in its class. SWANLEY GEM, rosy-salmon, large white centre, bold truss. TITANIA, rich crimson-maroon, clear white eye.

Single-flowered Varieties specially adapted for Bedding. DR. ORTON, rich dark crimson; very compact and floriferous. HENRY JACOBY, much like DR. ORTON in colour and habit, trusses extra fine; one of the best for bedding or pots, fast becoming a great favourite. JOHN GIBBONS, bright orange-scarlet; very free-flowering; vigorous habit. MRS. HOLDEN, deep rose, petals very narrow, the upper ones blotched with white; dwarf, very free-flowering, and showy. MRS. LEAVERS, deep pink, upper petals blotched white, large truss; dwarf habit. MRS. TURNER, purplish-pink, petals narrow, very large truss; vigorous habit. REV. A. ATKINSON, crimson-scarlet, trusses very large, somewhat loose; free-flowering, vigorous habit. TRIOMPHE DE STELLA, bright orange-scarlet; dwarf, and exceedingly floriferous. VESUVIUS, scarlet, small white eye; an old, well-known variety. WALTHAM SEEDLING, magenta-scarlet; very free-flowering. WEST BRIGHTON GEM, clear scarlet; very dwarf and free-flowering. WHITE CLIPPER, white; very free; one of the best white varieties for bedding.

Double-flowered Varieties suitable for Pot Culture. CANDIDISSIMUM PLENUM, double white, sometimes slightly tinged

Pelargonium—*continued.*

pink; large. CHARLES DARWIN, deep purplish-crimson, semi-double. CHARLES LALANDE, intense crimson, flowers and trusses medium-sized. DR. JACOBY, peach, shaded white. ÉDOUARD LEQUIN, magenta-red; very showy. F. V. RASPAIL, deep scarlet, fine large pips; compact habit. GUILLON MANGILLI, magenta-scarlet, top petals orange-scarlet, semi-double, trusses very large; a very showy variety, one of the best. HENRY CANNELL (Thorpe), scarlet, semi-double; excellent truss and habit. J. C. RODBARD, orange-scarlet, large. JEWEL, pure scarlet, flowers small, resembling the blossom of a double Hawthorn, trusses small and neat; distinct, and useful for button-

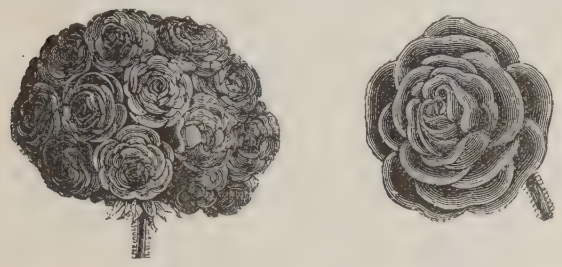


FIG. 69. TRUSS AND SINGLE FLOWER OF DOUBLE ZONAL PELARGONIUM (JEWEL).

holes and bouquets (see Fig. 69). LA CANDEUR, white, double. LE CYGNE, pure white; fine form, and very compact habit, one of the best. LOUIS BUCHNER, pale salmon; good form. MADAME A. BALTET, nearly pure white; free habit. MADAME THIBAUT, magenta-rose, upper petals marked white; very free-flowering, compact habit. MAGENTA KING, magenta, fine large flowers and trusses. MARIE LEMOINE, soft carmine, large flowers and trusses; dwarf and free. M. PASTEUR, deep crimson, large, well formed. ROI DES VIOLETTES, rich violet-purple, large and double. WONDERFUL, orange-scarlet, semi-double; a sport from the single variety VESUVIUS, the habit of which it retains.

Variegated-leaved Pelargoniums.

These need no separate descriptions, as there is so little variation in the different varieties, of which a sufficiently extensive selection is given:

Golden Tricolors. EDWARD RICHARD BENYON, FLORENCE, JOHN DOWNIE, LADY CULLUM, MACBETH, MARIE STUART, MRS. POLLOCK, PETER GRIEVE, SOPHIA DUMARESQUE.

Silver Tricolors. DOLLY VARDEN, EVA FISH, LADY DOROTHY NEVILLE, LASS O'GOWRIE, MINNIE WARREN, MRS. CLUTTON, MRS. LAING, MRS. R. B. POSTANS, PRINCE SILVERWINGS.

Golden Bronze. BLACK DOUGLAS, GOLDEN HARRY HIEOVER, GOLDEN SUPERB NOSEGAY, MARÉCHAL MACMAHON, MODEL, THE SHAH.

Silver Variegated. FLOWER OF SPRING, LITTLE TROT, MANGLES' VARIEGATED, MISS KINGSBURY, PRINCESS ALEXANDRA.

Yellow Leaved. CREED'S SEEDLING, CRYSTAL PALACE GEM, ROBERT FISH.

Ivy-leaved Pelargoniums.

Single-flowered. BEAUTÉ DE LYON, purplish-scarlet, large trusses; bold foliage. BRIDAL WREATH, pure white ground, small pink eye; bushy, half-trailing habit; very pretty. DUKE OF EDINBURGH, pale rose, upper petals veined; large variegated leaves, yellowish-green with white margin; free, trailing habit. GEM, blush-white, crimson spot on upper petals; compact, upright-growing habit. INNOCENCE, large white flowers, shaded lilac; free, trailing habit, free-flowering. LA FRANCE (hybrid), beautiful light rose, trusses and flowers very large; free habit, extra fine. L'ÉLÉGANTE, large white flowers; plant of free, trailing growth, with variegated leaves. MASTERPIECE, rich magenta-crimson, trusses of immense size, with large flowers. MRS. H. CANNELL, deep mauve-purple, large trusses. NEMESIS, scarlet; upright-growing habit, very bright and distinct. ST. GEORGE, light rose; flowers of medium size, with broad petals; of vigorous growth and floriferous habit. WILLSII, bright rose; plant of half-trailing habit, free-flowering and showy; one of the oldest varieties.

Double and Semi-Double Flowered. ABEL CARRIÈRE, soft magenta, maroon in upper petals, flowers of extra size and finest form. A. F. BARRON, lilac-rose, flowers large and very full; short-jointed and free habit. CANDEUR, almost pure white, flowers very double; free habit. COMTE H. DE CHOISEUL, flowers very large, full, of a most pleasing shade of colour. COMTESSE H. DE CHOISEUL, beautiful satiny-rose, light margin; a fine variety. CONGO, lilac, centre rose, light edges, of finest form and substance; effective. EMILE LEMOINE, rich orange-scarlet shade, pips very large, semi-double; extra fine and distinct. GENERAL GORDON, beautiful shade of deep rosy-cerise; distinct. GLOIRE DE NANCY, deep rosy-lake, large trusses, medium-sized flowers; very distinct. GLOIRE D'ORLÉANS, rich crimson-magenta, trusses and flowers medium, produced in the greatest abundance; habit dwarf and

Pelargonium—*continued.*

short-jointed. ISIDORE FÉRAL, light rose, pleasing shade, flowers large, very double; one of the best. JEANNE D'ARC, white, suffused light lavender, flowers very large and double; an acquisition, and one of the finest varieties in size of flower. LA ROSIÈRE, soft satiny-rose, lighter margin, flowers very double; free and distinct. LOUIS THIBAUT, deep red, large flowers; of fine shape and substance. MADAME COCHIN, silvery-lilac, slightly marked with maroon on the upper petals; distinct. MADAME CROUSSE, rose-pink, semi-double trusses and flowers, very large and beautiful; extra fine. MADAME E. GALLÉ, nearly pure white, very double and large; one of the best. MADAME THIBAUT, bright rose, flowers very large and exceedingly double; habit compact and floriferous, extra fine. MADAME THUVENIN, soft rosy-cerise, large, pretty shade of colour. MARGUERITE JACQUOT, rosy-pink, edged silvery-blush, large and double. MASSENET, bright magenta, semi-double, bold truss. M. DE LESSEPS, reddish-pink, large pips; very full, and of fine shape. MRS. MOORE, white, bordered lilac and crimson. VISCOUNTESS CRANBROOK, satin-rose, a beautiful shade of colour, very double; dwarf, and short-jointed.

PELECYPHORA (from *pelekyphoros*, hatchet-bearing; referring to some fancied resemblance in the tubercles to a hatchet). Hatchet Cactus. ORD. *Cacteæ*. A monotypic genus, very nearly allied to *Mammillaria*. The species and its variety require a sandy soil, good drainage, and very careful supplies of water. Propagated most readily by seeds, which germinate freely in moderate heat; offsets are seldom produced. *See also* **Cactus.**

P. aselliformis (woodlouse-like).* *fl.* white, rose, borne near the summit of the stem, 1in. to 1½in. in diameter, consisting of several series of sepals and petals, numerous stamens and stigmas. Stem short, cylindrical, covered with mammillæ or tubercles of a flattened form; at the apex, and in the place of the spines of the Mammillarias, are two rows of flat, horny scales, which overlap, like the tiles of a roof. June. *h.* 4in. Mexico, 1843. Greenhouse. The specific name refers to the rows of scales, which have been compared to the scaly back of a woodlouse. (I. H. vi. 186.)

P. a. concolor (one-coloured). *fl.* 1½in. in diameter, clustered towards the top of the stem; perianth tube short, free, naked, funnel-shaped; segments in about four series, rose-purple, obovate-oblong, acute; stamens very numerous. Stem tufted, shortly cylindric, 3in. to 4in. high, 1½in. to 2in. in diameter, often constricted about the middle; apex rounded; mammillæ spirally arranged, vertical, ¼in. long, woolly in the axils; spines minute, pungent. Mexico. (B. M. 6061.)

PELEXIA (from *pelex*, a helmet; referring to the shape of the back sepals). ORD. *Orchideæ*. A genus consisting of seven or eight species of stove, terrestrial orchids, natives of tropical America, from Brazil to the West Indies and Central America. Flowers mediocre, arranged in a sometimes dense, sometimes elongated and loose, sub-sessile spike; back sepals erect, connate with the petals in a narrow galea; lateral ones linear; lip affixed to the base of the peltate column, erect, linear, canaliculate, the base produced into a spur-like lamina; column short. Leaves either radical and long-stalked, or few and many-sheathed at the base of a simple stem. The species are not very ornamental. For culture of those given below, *see* **Goodyera.**

P. setacea (bristly). *fl.*, perigone greenish, about 1in. long; divisions linear, setaceous-acuminate; lip lanceolate, acuminate, ciliated; spur half-free, filiform, curved. *l.* elliptical, pointed, long-petioled, 3in. to 6in. long. *h.* 1ft. to 2ft. West Indies, 1834. (B. M. 3403, under name of *Neottia calcarata*.)

P. spiranthoides (Spiranthes-like). *fl.* greenish, with a white-variegated lip, disposed in a loose spike, 2in. to 8in. long; lip dilated at the summit into a roundish, bilamellate blade. *l.* elliptical, pointed, long-petioled, 4in. to 5in. long. *h.* 1ft. to 3ft. West Indies, 1823. (B. R. 985.)

P. triloba (three-lobed). *fl.* green, disposed in elongated, loose, many-flowered spikes; sepals acute, the lateral ones recurved; lip trilobed at apex. *l.* oblong, acute, shorter than the petioles. Brazil, 1870.

PELICAN FLOWER. A common name for *Aristolochia grandiflora*.

PELIOSANTHES (from *pelios*, livid, and *anthos*, a flower; alluding to the colour of the flowers of some species). SYNS. *Bulbospermum, Teta*. ORD. *Hæmodoraceæ*. A genus comprising about eight species of stove, perennial herbs, with short, horizontal rhizomes, natives of the East Indies and the Malayan Archipelago. Flowers greenish or lurid violet, rather small, disposed

Peliosanthes—*continued.*

in simple spikes or racemes, furnished with scarious bracts; perianth tube short above the ovary, broadly campanulate; limb rotate-spreading, of six broad, obtuse, sub-equal lobes; stamens six. Leaves radical, long-stalked, lanceolate or rather broad, acuminate at both ends, with elevated, sub-plicate veins; petioles sheathing at base. The species require a compost of loam, peat, and sand; they may be freely increased by suckers. The only two introduced to cultivation are described below.

P. humilis (humble). *fl.* greenish, in a rather dense raceme, 2in. to 6in. long; perianth segments thrice as long as the tube; scape 2in. to 6in. long. May. *l.* four to eight in a rosette, lanceolate, 3in. to 6in. long, 1in. to 2in. broad; petioles 6in. to 9in. long. Eastern Himalayas, 1809. (A. B. R. 634; B. M. 1532.)

P. Teta (Teta). *fl.* greenish, in a loose raceme, 6in. to 9in. long; scape 4in. to 6in. long. April. *l.* two to seven in a rosette, chartaceous, oblanceolate, nearly 1ft. long, 1½in. to 2½in. broad; petioles 6in. to 8in. long. Eastern Himalayas, 1807. (A. B. R. 605; B. M. 1302.)

PELLÆA (from *pellos*, dark-coloured; referring to the dusky colour of the fronds). Cliff Brake Fern. Including *Allosorus*, *Cheiloplecton*, *Holcochlæna*, and *Platyloma*. ORD. *Filices*. A widely-distributed genus, comprising about sixty species of stove and greenhouse ferns, with the habit of *Cheilanthes*. Sori intramarginal, terminal on the veins, at first dot-like or decurrent on the veins, but soon running into a line; involucre formed of the more or less changed edge of the frond, quite continuous, sometimes very narrow. For culture, &c., *see* **Ferns**.

P. andromedæfolia (Andromeda-leaved).* *sti.* 6in. to 9in. long, densely reddish-brown, scaly at base. *fronds* 6in. to 12in. long, 3in. to 6in. broad, ovate, tri- or quadri-pinnate; pinnæ rigid, erecto-patent, deltoid-lanceolate, the lowest with several linear-oblong pinnules, the lower segments of which are sometimes slightly branched; ultimate divisions about ¼in. long, blunt, with inrolled edges. Involucre wrinkled, scarcely changed from the substance of the frond, and sometimes nearly meeting edge to edge. America and Cape Colony. Greenhouse.

FIG. 70. PELLÆA BRACHYPTERA.

P. angustifolia cuneata (narrow-leaved, wedge-shaped). *sti.* 6in. to 12in. long, tufted, strong, erect, dark chestnut-brown. *fronds* 6in. to 12in. long, 3in. to 6in. broad, oblong-deltoid, quadri-pinnatifid; pinnæ 2in. to 4in. long, lanceolate-deltoid; pinnules cut down to the rachis into oblong, acute segments, which are ¼in. long, ⅛in. broad, cuneate at the base. Involucres broad, membranous, rolled over the sori. Mexico to Venezuela. Stove. (The type is figured in H. S. F. 119B, under name of *P. decomposita*.)

P. atropurpurea (dark purple).* *sti.* 3in. to 4in. long, tufted, rigid, tomentose. *fronds* 4in. to 12in. long, 2in. to 6in. broad, varying from lanceolate, and simply pinnate, to ovate-lanceolate, with deltoid pinnæ, which are 2in. to 3in. long, with several pinnules on each side, the latter nearly sessile, 1in. to 2in. long, hardly ¼in. broad, entire or sharply auricled at one or both sides at the base; rachis tomentose. Involucres formed of the slightly altered, incurved edge of the pinnules, at length nearly hidden by the broad line of the fruit. North America, &c., 1770. Greenhouse.

P. bella (handsome). *sti.* 3in. long, ebeneous. *fronds* 5in. to 6in. long, linear, bipinnate or sub-tripinnate; pinnæ ½in. to ⅝in. long, numerous, ovate, sessile; pinnules ¼in. long, linear-oblong, four to six-jugate, mucronate, rounded at base, the lowest sometimes

Pellæa—*continued.*

bi- or ternate, the edges strongly revolute. California, 1873. Greenhouse.

P. brachyptera (shortly-winged).* *rhiz.* short-creeping, scaly towards the end. *sti.* 4in. to 6in. long, castaneous. *fronds* 4in. to 6in. long, lanceolate, bipinnate; pinnæ very short, sessile, semicircular, erecto-patent, the lower ones consisting of seven to nine narrow-linear pinnules, ⅜in. to ½in. long, with mucronate tips, rounded bases, and revolute edges. California, 1873. Greenhouse. This is regarded by some authorities as a variety of *P. ornithopus*. See Fig. 70, for which we are indebted to Messrs. W. and J. Birkenhead.

P. Breweri (Brewer's). *sti.* 2in. to 3in. long, tufted, flaccid, bright chestnut-brown, slightly scaly. *fronds* 3in. to 9in. long, 1in. to 1½in. broad, linear-lanceolate; pinnæ twelve to eighteen on each side, slightly stalked, broader in the barren than in the fertile frond, varying from lanceolate-oblong and entire to auricled at one or both sides at the base, or cut down nearly to the rachis in the lower part into oblong lobes. Involucres similar in colour and texture to the frond, broad, and much wrinkled. Cape Colony. Greenhouse.

P. Bridgesii (Bridges').* *sti.* wiry, erect, 2in. to 4in. long, bright chestnut-brown. *fronds* 4in. to 6in. long, 1in. or less broad, linear, simply pinnate; pinnæ six to eight on each side, sessile, oblong, entire, obtuse, cordate or rounded at base. *sori* in a broad, marginal line, with the much-wrinkled, membranous edge of the frond protruding beyond it till full maturity. California, 1875. Greenhouse. (H. S. F. 142B.)

P. Brownii (Brown's). A synonym of *P. paradoxa*.

P. calomelanos (beautiful-dark). *sti.* 4in. to 6in. long, strong, erect, dark brown. *fronds* 4in. to 8in. long, 3in. to 6in. broad, sub-deltoid, bi- or tripinnate; lower pinnæ rigid, spreading or erecto-patent, linear-oblong, and simply pinnate or deltoid and bipinnate; ultimate segments on rigid, black stalks, the lateral ones ¼in. to ⅜in. each way, varying in shape from cordate-oblong-obtuse to hastate-triangular, about as broad as long, the two sides at the base often unequal. *sori* in a broad, marginal line, soon hiding the narrow, membranous involucre. South Africa, 1830. Greenhouse. SYN. *Pteris hastata*. (B. M. 4769, under name of *Allosorus calomelanos*.)

P. consobrina (related). *sti.* 6in. to 12in. long, strong, erect, dark brown. *fronds* 6in. to 12in. long, 4in. to 9in. broad, deltoid, tri- or quadripinnatifid; lowest pinnæ deltoid, with the pinnules of the lower side larger than the others, these latter usually cut down into several lanceolate or deltoid, pinnatifid segments; simple ultimate divisions linear-oblong. *sori* in a continuous line along the margins; involucres moderately broad, membranous, the edge of the segments often inrolled. South Africa, &c. Greenhouse. (H. S. F. 117A.)

P. cordata (heart-shaped).* *sti.* 6in. to 9in. long, strong, erect, straw-coloured, when young scaly beneath. *fronds* 1ft. or more long, 4in. to 6in. broad, deltoid-lanceolate; pinnæ erecto-patent, deltoid-lanceolate, with a straight rachis, the lower ones slightly branched at the base; segments shortly stalked, oblong or ovate, rounded or cordate at base, ¼in. to 1in. long, with a blunt point; rachis and both surfaces pubescent. *sori* in broad, marginal lines, which soon hide the involucres. Tropical America, 1820. Greenhouse. (B. M. 4698, under name of *Allosorus cordatus*.) *P. sagittata* is regarded, by Mr. Baker, as a form of this species.

P. c. flexuosa (zigzag). A variety with zigzag rachises, the pinnæ and pinnules spreading at right angles, or even deflexed. 1838. Stove. SYN. *P. flexuosa*. (B. M. 4762, under name of *Allosorus flexuosus*.)

P. crispa (curled). A synonym of *Cryptogramme crispa*.

P. densa (dense). *sti.* 4in. to 6in. long, tufted, slender, wiry, chestnut-brown. *fronds* 2in. to 3in. long, 1in. to 1½in. broad, oblong-deltoid, tripinnate; pinnæ and pinnules crowded, deltoid or lanceolate; segments numerous, linear, with inrolled edges, sessile or shortly stalked, sharp-pointed or mucronate, the terminal ones largest, sometimes ¼in. long. Involucres broad, rigid, rolled permanently over the sori. North America. Greenhouse. (H. S. F. 125B.)

P. falcata (sickle-shaped).* *rhiz.* wide-creeping. *sti.* 3in. to 6in. long, strong, erect, pubescent and scaly. *fronds* 6in. to 18in. long, 1in. to 2in. broad, linear-oblong, simply pinnate; pinnæ ten to twenty on each side, lanceolate or lanceolate-oblong, ¼in. to 1in. long, usually mucronate, often slightly falcate, cuneate or dilated and cordate at base; rachis densely scaly and tomentose. *sori* in broad, marginal lines, soon hiding the narrow involucres. Australia, &c., 1823. Greenhouse. (H. S. F. 11B.)

P. flexuosa (zigzag). A synonym of *P. cordata flexuosa*.

P. geraniæfolia (Geranium-leaved).* *sti.* 6in. to 9in. long, erect, wiry, brownish-black, slightly scaly towards the base. *fronds* 2in. to 4in. each way, deltoid, cut nearly to the rachis into three or four pinnæ on each side, of which the lowest pair is much the

Pellæa—*continued.*

largest, with the pinnules on the lower side much larger than the others, and deeply lobed, with linear-oblong segments. *sori* in broad, marginal lines. Tropics, &c. Greenhouse.

P. glauca (glaucous). *sti.* 4in. to 8in. long, tufted, strong, erect, dark chestnut-brown. *fronds* 3in. to 4in. each way, deltoid, quadripinnatifid; lowest pinnæ much the largest, and the pinnules on the lower side larger than the others, lanceolate-deltoid, cut down to the rachis into segments, which are again cut down to the rachis below; ultimate divisions about ⅛in. long, linear-oblong, with inrolled edges, more or less crenate; lower surface and rachis tomentose. Involucres coriaceous, rolled down over the sori. Chili and Mexico. Stove. SYN. *Pteris glauca.*

P. gracilis (slender). *sti.* 2in. to 3in. long, scattered, slender, straw-coloured or pale brown. *fronds* 2in. to 4in. long, 1in. to 2in. broad, ovate, bi- or tripinnatifid; pinnæ deltoid-lanceolate, 1in. to 2in. long, cut down to the rachis; lower pinnules sometimes again slightly divided; ultimate segments of the barren frond obovate, slightly crenate; those of the fertile one linear-oblong, the terminal one much larger than the others. Involucres broad, continuous, membranous. North America, North India, &c. Greenhouse. (H. S. F. 133B.) SYNS. *P. Stelleri, Pteris gracilis, Pteris Stelleri.*

FIG. 71. PELLÆA HASTATA.

P. hastata (spear-shaped).* *sti.* 6in. to 12in. long, wiry, erect, dark chestnut-brown. *fronds* 6in. to 2ft. long, 6in. to 12in. broad, oblong, bi- or tripinnate; pinnæ erecto-patent, varying from simply pinnate to copiously bipinnate; ultimate divisions 1in. to 2in. long, ovate or lanceolate, not toothed, sessile or nearly so. *sori* in a narrow, continuous, marginal line; involucres rather narrow, membranous, nearly or quite hidden when the fruit is mature. South Africa. Greenhouse. See Fig. 71.

P. intramarginalis (involucred within margin). *sti.* 3in. to 6in. long, erect, tufted, dark chestnut-brown. *fronds* 6in. to 12in. long, 2in. to 4in. broad, ovate-lanceolate, bipinnatifid; pinnæ 2in. to 3in. long, lanceolate, opposite, cut nearly to the rachis into linear-oblong pinnules. *sori* copious, confluent, marginal; involucres broad, membranous, fringed. Mexico and Guatemala, 1841. Stove.

P. i. serratifolia (serrate-leaved). In this variety the pinnules are distinctly toothed. SYN. *Pteris fallax.*

P. involuta (involute). *sti.* 2in. to 3in. long, wiry, erect, blackish, tufted. *fronds* 3in. to 4in. long, 1in. to 1½in. broad, oblong-lanceolate, tripinnatifid; lower pinnæ opposite, deltoid-lanceolate, cut down to the rachis into several deltoid pinnules, the upper of which are ternately lobed, the lower cut down to the rachis below. *sori* continuous; involucres distinct and pale, membranous. Cape Colony, &c. Greenhouse.

P. longimucronata (long-mucronate). A synonym of *P. mucronata.*

P. mucronata (mucronate). *sti.* 2in. to 4in. long, tufted, erect, dark brown. *fronds* 3in. to 6in. long, 1in. to 3in. broad, deltoid, bipinnate; pinnæ 1in. or more long, spreading or erecto-patent,

Pellæa—*continued.*

rigid, with several distant, linear-oblong pinnules on each side, about ¼in. long, with inrolled edges and a sharp, mucronate point. Involucres broad, coriaceous, rolled permanently over the sori. Mexico, &c., 1865. Nearly hardy. SYNS. *P. longimucronata* (H. S. F. 115A), *P. Wrightiana* (H. S. F. 115B).

P. ornithopus.* Bird's-foot Fern. *sti.* 3in. to 6in. long, tufted, rigid, dark chestnut-brown. *fronds* 4in. to 6in. long, 2in. to 3in. broad, deltoid, bipinnatifid; pinnæ 1in. to 1½in. long, ¼in. to ⅜in. broad, rigid, spreading, with numerous, distantly-placed, sessile pinnæ on each side, which are cut to the base into three linear, mucronate segments, of which the central one is the largest. Involucres broad, coriaceous, crenate, rolled permanently over the sori. California 1875. Greenhouse. (H. S. F. 116A.)

P. paradoxa (paradoxical). *sti.* 6in. to 9in. long, strong, erect, dark brown, sometimes slightly tomentose. *fronds* 6in. to 9in. long, 4in. to 6in. broad, oblong, simply pinnate; pinnæ four to six on each side, short-stalked, with a considerable space between them, 1½in. to 2in. long, lanceolate, entire, acute or bluntish, cordate or rounded at the base; rachis tomentose. *sori* in a marginal line, often ⅛in. broad, soon hiding the involucre. Australia. Greenhouse. (H. S. F. 111A.) SYN. *P. Brownii.*

P. pulchella (pretty). *sti.* 2in. to 3in. long, wiry, erect, dark chestnut-brown, tufted. *fronds* 3in. to 6in. long, 1in. to 3in. broad, oblong, tripinnate; lower pinnæ deltoid; pinnules lanceolate; ultimate segments very deciduous, oblong, blunt, about ⅛in. long and half as broad; edges of the fertile segments much inrolled. Involucres broad, permanently rolled over the sori. Andes of tropical America. Stove.

FIG. 72. PORTION OF FROND OF PELLÆA ROTUNDIFOLIA.

P. rotundifolia (round-leaved).* *rhiz.* stout, scaly, creeping. *sti.* 6in. to 12in. long, stout, erect, more or less pubescent and scaly. *fronds* 6in. to 12in. long, 1in. to 1½in. broad, linear, simply pinnate; pinnæ ten to twenty on each side, short-stalked, oblong or roundish, entire, obtuse or mucronate at the apex; rachis densely scaly and tomentose. *sori* in a broad, marginal line, soon hiding the involucre. New Zealand and Norfolk Island, 1841. Greenhouse. See Fig. 72.

P. sagittata (arrow-like). A variety of *P. cordata.*

P. Stelleri (Steller's). A synonym of *P. gracilis.*

P. ternifolia (ternate-leaved). *sti.* 2in. to 4in. long, strong, erect, dark chestnut-brown, densely fibrillose at base. *fronds* 6in. to 12in. long, 1in. to 1½in. broad, lanceolate-linear, with six to twelve opposite pairs of pinnæ, which are cleft nearly to the base into three linear, mucronate, rigid segments, with inrolled edges. Involucres formed out of the edge of the frond, rolled over the sori till they attain full maturity. Tropical America, 1841. Stove.

P. Wrightiana (Wright's). A synonym of *P. mucronata.*

PELLIONIA (named after A. M. J. Alphonse Pellion, an officer in Freycinet's voyage round the world). ORD. *Urticaceæ.* A genus comprising fifteen species of mostly stove herbs, often creeping at base, rarely suffruticose; they inhabit tropical and Eastern Asia, as far as Japan, and the Pacific Islands. Flowers dicœcious or moncœcious, densely cymose or sub-capitate; perianths of five, rarely four, divisions. Leaves variable. The only species introduced are stove, creeping, perennial herbs, with ornamental foliage. They thrive in rich, sandy loam, and require a moist atmosphere. Propagated by divisions, or by cuttings.

Pellionia—*continued.*

P. Daveauana (Daveau's).* *fl.* green; females very minute; males six to eight times larger; perianths five-parted; inflorescence pedunculate, densely cymose. August. *l.* alternate, stipulate, ¼in. to 2¼in. long, oblique, roundish-elliptic or elliptic-oblong, obtuse, dark bronzy-olive-green, slightly tinted with violet, or marked with a broad, central, irregular band of bright green. Stems succulent. Cochin China, 1880. A charming creeper. SYN. *Begonia Daveauana.* (I. H. n. s. 472.)

P. D. viridis (green). *l.* uniformly bright green, with whitish blotches. Stem, as well as the petioles, midrib, and veins of the leaves, sparsely hairy. 1882.

P. pulchra (pretty).* *l.* alternate, petiolate, stipulate, obliquely oblong, very obtuse, obliquely cordate at base; upper surface dull blackish along the midrib and veins; under surface pale, and rather delicate purplish; primary veins five on each side. Stem fleshy, creeping, tinged with a dull purplish colour. Cochin China, 1882. Plant glabrous, except a few hairs on the upper side of the petioles. (I. H. 479.)

PELLITORY. *See* **Pyrethrum Parthenium.**

PELONASTES. Included under **Myriophyllum** (which *see*).

PELORIA. "An irregular flower, become regular by a monstrous development of complementary irregularities" (Asa Gray).

PELTANDRA (from *pelte*, a target, and *aner*, *andros*, a stamen; alluding to the shape of the stamens). SYNS. *Lecontia, Renselaeria.* ORD. *Aroideæ* (*Araceæ*). A genus comprising only a couple of species of hardy, marsh-loving, perennial herbs, with very slender rhizomes, natives of North-eastern America. Spathe convolute, with an elongated, persistent tube, and the margins of the lamina undulated; spadix much shorter than the spathe, slender, erect, cylindrical, almost entirely covered, except at the top, with densely-crowded flowers. Leaves sub-peltate, hastate, with very slender, dense nerves; petioles long, sheathing. *P. virginica*, the species best known in gardens, must be grown, like *Calla*, in shallow water, in a sunny, sheltered pond.

P. virginica (Virginian). Arrow Arum. *fl.* thickly covering the long and tapering spadix throughout; "upper portion of the spathe, and sterile portion of the spadix, rotting away after florescence, leaving the fleshy base firmly inclosing the globular cluster of fruit" (Asa Gray). June. *l.* large, pointed; nerves reticulated next the margin. *h.* 1ft. 1759.

PELTANTHERA. A synonym of **Vallaris** (which *see*).

PELTARIA (from *pelte*, a small buckler; alluding to the form of the pods). ORD. *Cruciferæ.* A genus comprising three species of hardy, tall, glabrous, perennial herbs, natives of South Europe, Asia Minor, Syria, and Persia. Flowers white, sub-corymbose. Pods large; fructiferous pedicels patent or recurved, filiform, ebracteate. Leaves entire; cauline ones cordate-sagittate at base. *P. alliacea* is a pretty little plant. It flourishes in any light soil, and may be increased either by seeds, or by division.

P. alliacea (Onion-scented).* *fl.*, calyx equal; petals entire. June. Pods flat, smooth. *l.*, cauline ones sagittato amplexicaul. *h.* 1ft. Eastern Europe, 1601. The plant emits a Garlic-like odour. (J. F. A. 123.)

PELTATE. Target-shaped; shield-like. A leaf is said to be Peltate when the petiole is attached to the lower surface instead of to the margin. See Fig. 73.

FIG. 73. PELTATE LEAF OF INDIAN CRESS.

PELTATIFID. When a peltate leaf is sub-divided.

PELTINERVED. Radiately-nerved. When the nerves of a leaf are disposed in a peltate manner.

PELTOPHORUM (from *pelte*, a small shield, and *phoreo*, to bear; in reference to the shape of the stigma). ORD. *Leguminosæ.* A genus of about half-a-dozen species of tall, unarmed, stove trees, of which two or three are tropical American, one is found in South-eastern Africa, and two in the Indian Archipelago and tropical Australia. Flowers yellow, racemose; calyx segments five, imbricated; petals five, orbicular, spreading, much-imbricated; racemes paniculate, at the tips of the branches. Pods oblong-lanceolate, rarely elongated, flat-compressed, indehiscent. Leaves bipinnate; leaflets small, numerous. *P. Linnæi* is described in this work as *Cæsalpinia brasiliensis.*

Peltophorum—*continued.*

PELTOSTIGMA (from *pelte*, a buckler, and *stigma*; alluding to the protuberance of the stigma). SYN. *Pachystigma.* ORD. *Rutaceæ.* A monotypic genus. The species is a very glabrous, low, fragrant, stove, evergreen tree. It thrives in sandy loam and fibry peat. Propagated by cuttings, inserted under a bell glass, in heat.

P. pteleoides (Ptelea-like). *fl.* white, rather large, puberulous outside, disposed in fastigiate, long-stalked, few-flowered, trichotomous cymes; sepals three or four, free, deciduous, two outer ones smaller; petals four, broadly obovate, concave; pedicels with leafy bracts. February. *l.* alternate, trifoliolate; leaflets elliptic, sub-entire, gland-dotted. Jamaica, 1844.

PELVIFORM. Shallowly cup-shaped; basin-like.

PEMPHIGUS. A genus of Aphides, distinguished from the more frequently observed forms by the six-jointed, short antennæ, the absence of honey tubes near the end of the body, and the front wings having all the veins that end on the hind margin unbranched. The body is generally more or less bedecked with a woolly secretion, especially near the tip. Several species are found in Britain. Of these, some form galls on Elms, and on Poplars (*e.g.*, *P. bursarius* on leafstalks of the Black Poplar), while most of them feed on the roots of plants, especially of *Compositæ* and of grasses. The latter species may be found in small companies, in cavities, loosely lined with the white secretion. The insects prefer light, sandy soils. *P. lactucarius* and *P. fuscifrons* both injure garden Lettuces considerably at times. *See* **Lettuce.** M. Lichtenstein, of Montpellier, has brought forward strong arguments in support of the belief that the gall-makers pass through a cycle, in which a generation of gall-makers on trees alternates with one feeding on the roots of herbaceous plants; and he has proved that this occurs with the allied *Tetraneura Ulmi*, the maker of the erect galls (about the size of small Cherry-stones), common on Elm leaves in various English localities. This species of *Aphis* he has traced from the Elm galls to roots of Maize, and of *Cynodon dactylon*, and *vice versâ.*

PENÆA (named after P. Pena, author, with Lobel, of "Adversaria Botanica," 1570). ORD. *Penæaceæ.* A small genus (nine species) of very dwarf-growing, greenhouse, evergreen, much-branched, densely leafy shrubs, natives of South Africa. Flowers yellow or reddish, solitary, axillary, at the ends of the branches, forming leafy spikes; perianth tube oblong-cylindrical or ovoid, the lobes of the limb valvate. Leaves opposite, sessile, entire, coriaceous; floral ones more conformed, or broader and shorter, than the cauline ones. It is doubtful whether those species described below are still in cultivation. They require a sandy-peat soil. Propagation may be effected by cuttings, inserted in sand, under a glass.

P. mucronata (mucronate). *fl.* and bracts yellow or purplish. June. *l.*, lower ones ovate, acute, caducous; middle ones ovate, acuminate, broadly sub-cordate at base; uppermost ones reduced to bracts. *h.* 2ft. 1787. (L. B. C. 1770.)

P. myrtoides (Myrtle-like). *fl.* red. June. *l.* sessile, ovate or ovate-elliptic, obtuse, flat. *h.* 2ft. 1816.

P. squamosa (scaly). A synonym of *Sarcocolla squamosa.*

PENÆACEÆ. A small natural order of much-branched shrubs, confined to South Africa, and of doubtful affinity with any other order. Flowers hermaphrodite, regular, solitary in the upper axils, sub-sessile; perianth

Penæaceæ—*continued.*

inferior, with an ovoid or cylindrical tube, and a limb of four valvate or reduplicate-margined lobes; stamens four, affixed to the throat; filaments short; anthers continuous with the filaments, erect, two-celled. Capsule included in the persistent perianth. Leaves opposite, numerous, rather small, entire, coriaceous; stipules absent. The order comprises four genera and about a score species, none of which have any known economic value. Examples: *Penæa*, *Sarcocolla*.

PENANG LAWYERS. *See* **Licuala acutifida.**

PENCIL FLOWER. *See* **Stylosanthes.**

PENDULOUS. Drooping; hanging down.

PENICILLATE. Resembling a pencil; consisting of, or covered with, tufts of hairs.

PENNATE. The same as **Pinnate** (which *see*).

PENNIFORM. Feather or plume-shaped.

PENNINERVED, PENNIVEINED. Having main veins or ribs running straight from the margins at equal distances.

PENNISETUM (from *penna*, a feather, and *seta*, a bristle; referring to the long, feathered bristles of the flower-spikes). Including *Gymnothrix*. ORD. *Gramineæ*. A rather large genus (nearly forty species) of tropical and sub-tropical grasses, mostly African, and principally requiring greenhouse treatment. Spikelets two to four, in a simple spike, involucrate; bristles distinct, deciduous with the spikelet, the interior plumose below. Sterile glumes three, or two by abortion of the lowest, membranous. Many of the species are very ornamental, and well worth growing. They are usually annuals, and are of very easy culture in ordinary garden soil. Propagated by seeds. The following are desirable plants:

P. cenchroides (Cenchrus-like). *fl.*, spikes 1in. to 3in. long; spikelets ascending, sessile, crowded, oblong, acute, ⅛in. long, densely plumose in the lower part. *l.* linear, acute, glabrous. Stems 1ft. to 2ft. long, ascending, branched. Warm regions of both hemispheres, 1777. Annual.

P. compressum (compressed). *fl.*, involucres nearly sessile, in a simple, cylindrical, dense spike of 3in. to 6in., consisting of numerous, very unequal bristles. *l.* long and narrow, glabrous, the ligula prominent. Stems 2ft. to 3ft. high, erect, scabrous, and more or less hirsute under the panicle. Australia, 1820 Annual.

P. latifolium (broad-leaved).* *fl.*, inflorescence consisting of amentiform, nodding spikes. *l.* broad-lanceolate, spreading, bright green, with the broad median vein whitish; ligule short, hairy. Stems robust-growing, cane-like, attaining a height of from 9ft. to 10ft. Monte Video, 1869. A very ornamental perennial, forming handsome tufts. It may be grown in the open air during the summer months; the roots should be taken up at the approach of winter, and placed under cover. SYN. *Gymnothrix latifolia*. (R. H. 1869, 69.)

FIG. 74. PENNISETUM LONGISTYLUM.

P. longistylum (long-styled).* *fl.*, inflorescence in spikes from 4in. to 6in. long, having a singularly twisted appearance, and enveloped in a feathery down of a purplish colour. August.

Pennisetum—*continued.*

l. narrow and gracefully arching. *h.* 1ft. to 1½ft. Abyssinia. An elegant species, generally treated as a half-hardy annual. See Fig. 74.

P. setosum (bristly). *fl.*, spikes purple, very dense, 6in. long; involucre of a dozen or more fine bristles, densely plumose in the lower part. *l.* linear, acute, glabrous or pilose. Stems 3ft. to 4ft. long. Tropical America, 1817. An erect perennial.

PENNY GRASS. *See* **Rhinanthus crista-galli.**

PENNY PIES. A common name applied to the leaves of *Cotyledon Umbilicus*.

PENNYROYAL (*Mentha Pulegium*). This hardy perennial is a native of Europe (Britain), North and West Asia, &c., and is cultivated for the occasional use of its leaves or tops in culinary preparations. It succeeds best in loamy soil, and in a moist situation. Propagation may be readily effected by division, in autumn or spring. In planting, allow a space of about 12in. between rows, and 6in. between plants in the row; water shortly afterwards, should the weather be dry.

PENNYWORT, or **PENNYLEAF.** A name applied to *Cotyledon Umbilicus*, *Hydrocotyle vulgaris*, *Linaria Cymbalaria*, and *Sibthorpia europæa*.

PENSTEMON. *See* **Pentstemon.**

PENTA. In Greek compounds, this signifies five; *e.g.*, Pentagonal, five-angled.

PENTACHÆTA (from *pente*, five, and *chaite*, a bristle; alluding to the five bristles at the base of the pappus). ORD. *Compositæ*. A small genus (four species) of greenhouse or hardy, small, slender, annual herbs, natives of California and Mexico. Flower-heads yellow, mediocre or rather small, solitary at the tips of the branches, radiate; ray-florets uniseriate; involucre hemispherical or broadly campanulate; receptacle flat or slightly convex, naked; achenes somewhat silky-villous. Leaves alternate, linear, entire, or rarely almost opposite and denticulate. *P. aurea*, the only species yet introduced, is readily grown from seeds, sown in sandy loam, in warm, sunny spots, in spring.

P. aurea (golden). *fl.-heads* golden-yellow, 1in. in diameter; ray-florets twenty to fifty. *l.* numerous, sessile, filiform-linear. *h.* 2in. to 3in. California, 1884. A pretty, dwarf, umbellately-branched, hardy herb. (R. G. 1153.)

PENTADACTYLON. A synonym of **Persoonia** (which *see*).

PENTADESMA (from *pente*, five, and *desma*, a bundle; the stamens are disposed in bundles of five). ORD. *Guttiferæ*. A monotypic genus, the species being a tall, stove tree, yielding a yellow, greasy juice (whence the popular name). It succeeds best in a mixture of loam and peat, and in a strong, moist heat. Propagation is effected by ripened cuttings (with their leaves not shortened), inserted in sand, under a glass, in a moist heat.

P. butyracea (buttery). Butter-and-Tallow-tree. *fl.* red, large, handsome, solitary and terminal; sepals passing gradually into the petals, which are imbricate, but scarcely contorted. November. *fr.* an edible berry. *l.* opposite, coriaceous, and elegantly marked with numerous parallel veins. Tropical Africa, 1822.

PENTAGONIA (from *pente*, five, and *gonia*, an angle; referring to the divisions of the corolla). ORD. *Rubiaceæ*. A genus comprising about eight species of stove shrubs, natives of tropical America. Flowers yellow, red, or greenish, large, but inconspicuous when compared with the foliage, in dense, axillary corymbs, sessile or nearly so; calyx with a turbinate, sub-cylindrical, or campanulate tube, and a spathaceous, or five or six-lobed limb; corolla funnel-shaped or tubular, thickly coriaceous, the limb of five or six valvate lobes. Leaves large, opposite, coriaceous, entire or pinnatifid, with large stipules. Branchlets thick, terete. For culture of *P. Wendlandi*—the only species yet introduced—*see* **Cinchona.**

Pentagonia—*continued.*

P. Wendlandi (Wendland's). *fl.* yellow, produced in clusters from the axils of the upper leaves; corolla tubular-sub-urceolate. July. *l.* very shortly petiolate, coriaceous, obovate-lanceolate, slightly acute, rounded at base, some of them 1½ft. long; petioles thick, naked. *h.* 2ft. 1861. (B. M. 5230.)

PENTAGYNIA. A Linnæan artificial order, characterised by five-styled flowers.

PENTAMEROUS. Consisting of five members in a circle.

PENTANDRIA. A Linnæan class, characterised by its flowers having five stamens.

PENTAPERA (from *pente*, five, and *pera*, a bag; referring to the five-celled ovary). ORD. *Ericaceæ*. A monotypic genus, the species being an ornamental, half-hardy, evergreen, Heath-like shrub. For culture, *see* **Erica.**

P. sicula (Sicilian). *fl.* flesh-coloured or white, sub-terminal, fasciculate, pedicellate, three-bracteate, nodding, rather large for the plant; sepals five, equal, ovate, acute, persistent; corolla marcescent, much larger than the calyx, globose-sub-urceolate, the lobes revolute, contorted. May. *l.* erecto-patent, verticillate, linear-oblong, obtuse, coriaceous, entire. *h.* 2ft. Sicily and Malta, 1849. Plant pubescent. SYN. *Erica sicula.*

PENTAPETES (from *pentapetes*, five-leaved, a name given by Theophrastus to the Cinquefoil; referring to the pentamerous arrangement of the flowers). ORD. *Sterculiaceæ*. A monotypic genus. The species is a showy, stove annual, thriving best in a compost of sandy loam and leaf mould. It may be increased by cuttings of half-ripened shoots, or by seeds.

P. phœnicea (scarlet).* *fl.* scarlet, rather large; calyx five-parted; petals five, broad; peduncles short, axillary, one-flowered. July. *l.* simple, lanceolate, halbert-shaped, serrated. *h.* 2ft. to 3ft. Tropical Asia, 1690. (B. R. 575.)

P. suberifolia. *See* **Pterospermum suberifolium.**

PENTAPHILTRUM. A synonym of **Physalis** (which *see*).

PENTAPHRAGMA. A synonym of **Physianthus** (which *see*).

PENTAPTERA. Included under **Terminalia** (which *see*).

PENTAPTERYGIUM (from *pente*, five, and *pterygion*, a small wing; in allusion to the five-winged calyx). ORD. *Vacciniaceæ*. A genus comprising about half-a-dozen species of greenhouse, glabrous or strigoso-hirsute, epiphytal shrubs, natives of the Eastern temperate Himalayas and the Khasia Mountains. Flowers red, yellow, or white bedewed with red, rather large, axillary, solitary, or disposed in few-flowered corymbs; calyx tube turbinate or hemispherical, five-winged; limb of five persistent, leafy lobes; corolla tubular, five-angled, with a limb of five sub-erect or recurved lobes; stamens ten. Leaves alternate, sub-sessile, rather large and scattered, or small and sub-distichously clustered, serrate. The species require well-drained peat, and may be grown either in teak baskets or in pots. Propagation may be effected by cuttings, inserted in sand, under a bell glass.

P. flavum (yellow).* *fl.* yellow, margined with red, 1in. long, on red pedicels, disposed in short, axillary, pendulous or nodding racemes; corolla tubular, inflated, with five small lobes. *l.* 2in. to 3in. long, ovate-lanceolate, acuminate, serrate, very shortly petioled, rugose above, paler below. *h.* 1ft. to 3ft. North-eastern India. (B. M. 4910.)

P. rugosum (wrinkled).* *fl.* pendulous, about 1in. long, in few-flowered corymbs; corolla nearly white, beautifully marbled between the five angles with purple or blood-red bands, the mouth contracted and greenish. *l.* almost sessile, sub-cordate at base, very much wrinkled, lanceolate or ovate-lanceolate, acuminate, serrate, deep bright green above, paler beneath; young ones purplish. *h.* 1ft. to 3ft. Khasia Mountains. (B. M. 5198.) SYN. *Vaccinium rugosum.*

P. serpens (serpentine). *fl.* numerous, axillary, hanging along the under side of the branches; calyx green, five-angled; corolla bright red, with darker, V-shaped marks, ⅔in. long. *l.* small, lanceolate. Stems slender, drooping. Rootstock large, tuberous. *h.* 2ft. to 3ft. Himalayas, 1884. A small and graceful shrub. (B. M. 6777.)

PENTARHAPHIA (from *pente*, five, and *raphis*, a needle; referring to the form of the open calyx). SYNS. *Conradia. Gesneria.* ORD. *Gesneraceæ*. A genus of about forty species of stove, branched shrubs, or low sub-shrubs, mostly natives of the West Indies, a few being also found in Columbia or Central America. Calyx with an obconical or turbinate tube and five equal, narrow lobes; corolla usually scarlet (sometimes green?), with an incurved tube, and an oblique or sub-bilabiate five-lobed limb; pedicels elongated and solitary in the axils, or shorter and fascicled, or on an axillary, trichotomous, many-flowered peduncle. Leaves alternate, at the tips of the branches, or often crowded on short stems, frequently oblique. The following species are those best known in gardens. For culture, *see* **Gesnera.**

P. cubensis (Cuban). *fl.* scarlet, tubular, about 1in. long, solitary in the axils of the leaves; peduncle brown, 1in. long. Summer. *l.* dark green, convex, evergreen, obovate, crenated near the point, and netted on the under side with green veins on a pale ground. *h.* 2ft. Cuba, 1854. A compact-habited shrub. (B. M. 4829; F. d. S. 297.)

P. floribunda (bundle-flowered).* *fl.* red, numerous, axillary, tubular, distended above the middle, the limb shortly three-lobed and irregular, the throat open. Summer. *l.* lanceolate, bullate above. Cuba, 1878. A dwarf, bushy-habited sub-shrub, more or less covered with close, reddish down. (R. H. Jan. 16, 1878.)

P. libanensis (Mont-Liban).* *fl.* crimson, fascicled in the axils; corolla tube longer than the lobes; pedicels short, at length excrescent. June. *l.* spathulate-oblong, unequally serrate, and repand, membranous, roughish, rugose, scabrous on the ribs beneath. *h.* 4in. Jamaica, 1847. Sub-shrub. (B. M. 4380, under name of *Gesnera libanensis*; F. d. S. 178, under name of *Rhytidophyllum floribundum.*)

P. neglecta (neglected). *fl.* on short, one-flowered peduncles; corolla tube broadly campanulate, as long as, or longer than, the broad lips. September. *l.* spathulate-oblong, bluntish, crenate above, tapering into the short petiole, membranous. *h.* 4in. Jamaica, 1847. Sub-shrub.

PENTAS (from *pente*, five; referring to the generally pentamerous arrangement of the flowers). SYNS. *Orthostemma, Vignaldia.* ORD. *Rubiaceæ*. A genus comprising six or eight species of stove, erect or prostrate, hispid-pilose or tomentose, herbs or sub-shrubs, with

FIG. 75. FLOWERING BRANCH AND DETACHED FLOWER OF PENTAS CARNEA.

terete branches, natives of tropical and South sub-tropical Africa, and Madagascar. Flowers lilac, bracteate, disposed in short or elongated, terminal, corymbose cymes, sometimes sub-capitate; calyx four to six-lobed; corolla funnel-shaped, with an elongated tube and four to six ovate-oblong, spreading, valvate lobes. Leaves opposite, petiolate, ovate or ovate-lanceolate; stipules much cut or bristly. The species, only two of which have been introduced, are of easy culture, in a compost of loam and leaf mould, with a little sand added. Propagated, in spring or at almost any season, by cuttings of the young shoots, inserted in sandy soil, and placed

Pentas—*continued.*

under a propagating glass, in gentle heat. The plants should be occasionally pinched as they grow, to encourage a more compact habit.

P. carnea (flesh-coloured).* *fl.* disposed in numerous, large, cymose heads. Winter, and almost all the year round. *l.* soft, opposite, bright green. *h.* 1½ft. South Africa, 1842. A handsome, compact-growing, soft-wooded sub-shrub. See Fig. 75. (B. M. 4086; B. R. 1844, 32.)

P. c. kermesina (carmine).* A showy plant, differing from the type chiefly in having flowers of a lively carmine-rose, tinted with violet in the throat. (R. H. 1870, 130.)

P. parviflora (small-flowered). *fl.* flame-colour; corolla tube twice or thrice as long as the calyx. April. *l.* ovate or oval-oblong, acuminate, narrowed at base, scarcely puberulous on the veins. *h.* 2ft. Western tropical Africa, 1846. Sub-shrub.

PENTATAXIS. Included under *Helichrysum.*

PENTLANDIA. Included under **Urceolina** (which *see*).

PENTSTEMON (from *pente*, five, and *stemon*, a stamen; the fifth stamen being present and conspicuous, although sterile). Beard-tongue. SYN. *Penstemon.* ORD. *Scrophularineæ.* A genus comprising about sixty-six species of very ornamental, mostly hardy, perennial herbs or sub-shrubs, natives of (mostly Western) North America, including Mexico. Flowers red, violet, blue, white, or rarely yellowish-white, showy; calyx of five imbricated segments; corolla tube usually elongated, equal or ventricose; limb bilabiate, the upper lip two-lobed, and the lower three-cleft, bearded or naked; stamens four, didynamous, shorter than the corolla, the staminode filiform, with a clavate or spathulate tip, generally much shorter than the stamens; peduncles dichotomously many-flowered, bracteate at the ramifications and disposed in a terminal panicle or thyrse, which is often leafy at base, rarely one-flowered, and disposed in a simple raceme. Leaves opposite, the radical and lower ones petioled, graduating into amplexicaul floral ones, or decreasing into bracts. Flowering branches often erect, simple, rarely diffusely branched. Amongst popular hardy plants, few surpass Pentstemons for their usefulness and ornamental character in the mixed border or rock-garden, or for planting in beds by themselves. Their flowering season commences about June, and continues until after the appearance of frost, in autumn. Many of the species are very attractive, and are indispensable in the choicest collection of herbaceous plants; and a selection from the numerous varieties, improved so much of late years, is equally valuable for garden decoration and for cut flowers.

Pentstemons are very varied in colour, and possess a naturally graceful and exceedingly floriferous habit. They may readily be propagated from seeds, and also from cuttings; the latter method being most generally adopted for perpetuating species and named varieties. Seeds may, however, sometimes be obtained, in favourable seasons, from plants that do not readily produce cuttings; under such circumstances, it is most important to collect them, if required for increasing stock. If preserved from named varieties, with a view to raising new ones, only such as have finely-formed flowers and distinct colours should be selected for seed-bearing. Seeds should be sown in pans or shallow boxes of light soil, about February, or early in March, and placed on a gentle hotbed. So soon as the seedlings are large enough to handle, they should be potted off singly, or pricked into boxes, and kept in a little warmth until established, when they may be gradually hardened and placed in a cold frame. Towards the end of May, plant them in a prepared border outside, where, if properly attended to, many will flower in the ensuing autumn. Seeds may also be sown, in the open ground, early in June, when the plants should be potted up in August, and preserved in cold frames through the winter, for flowering early the following year, after being again

Pentstemon—*continued.*

transferred to the outside. Cuttings root readily at almost any season when they are procurable. The best time to take them is in August and September, from the numerous side-growths that are usually plentiful at that season. They may be inserted in cutting-pots or pans, and placed in a close frame without artificial heat, or, failing this, under a hand glass, in a sheltered position, where coverings may be readily applied, if necessary, afterwards. For the winter, the plants succeed best in a cold frame; they may be put into permanent quarters again, outside, during April, or earlier, should the weather be favourable. It is important, first, to expose them for a few days, in order to thoroughly harden them, and avoid an undue check.

Although Pentstemons are hardy, they frequently succumb when subjected successively to wet and frost, the first-named being, perhaps, the more destructive of the two. It is important, therefore, to provide good drainage, particularly for any of the more select species or varieties. A sandy loam, enriched with leaf mould or decayed manure, should be the compost prepared, if necessary, or these ingredients may be added to fairly good soil in borders for enriching it. Pentstemons well repay for liberal treatment and a rich soil. They require plenty of water throughout the summer; it is in winter when they suffer from being too wet. The best plan is to insert cuttings annually, and preserve a stock in a cold frame. If any old plants are to kept outside, they should be covered, in autumn, with ashes.

The species and varieties best known to gardeners are described below; except where otherwise indicated, they are hardy, herbaceous perennials.

P. acuminatus (taper-pointed). *fl.* lilac, or changing to violet; corolla tube scarcely enlarged above; sterile filament bearded above; panicle strict, interrupted; cyme sessile, crowded. July. *l.* entire; radical ones petioled, oblong or ovate, obtuse, mucronulate; upper ones cordate, clasping. Stem erect, 1ft. high. 1827. (B. R. 1285.)

P. angustifolius (narrow-leaved). A synonym of *P. campanulatus.*

FIG. 76. PENTSTEMON BARBATUS, showing Habit and portion of detached Inflorescence.

P. antirrhinoides (Snapdragon-like).* *fl.* lemon-yellow; corolla ventricose, naked, with large lips; sterile filament densely bearded on one side; peduncles two-leaved, often one-flowered. Summer. *l.* spathulate-lanceolate or oval, sub-petiolate, rather small, entire. *h.* 9in. to 18in. 1824. Plant sub-cinereous, much-branched. (B. M. 6157.)

P. atropurpureus (dark purple). A synonym of *P. campanulatus.*

P. attenuatus (attenuated) *fl.* yellowish-white or bluish-purple, variable; corolla more than ½in. long; inflorescence villous or viscous-pubescent. July. *l.* very glabrous, nearly always entire, rarely slightly denticulate; cauline ones lanceolate or oblong. *h.* 1½ft. to 2ft. 1827. (B. R. 1295.)

P. azureus (azure-blue).* *fl.*, corolla of a beautiful azure-blue, reddish-purple at the base of the tube, more than 1in. long;

Pentstemon—*continued.*

panicle twiggy; peduncles one to three-flowered. August. *l.*, cauline ones narrow or broad- or ovate-lanceolate; lower ones sometimes spathulate-oblong; upper ones closely sessile from the base, broadly sub-cordate-ovate or ovate-lanceolate. *h.* 1ft. 1858. Plant very glabrous, glaucous. (L. J. F. 211; P. F. G. 64.)

P. a. Jaffrayanus (Jaffray's). *fl.* blue, large; peduncles one to five-flowered. *l.* oblong or oval, or the upper ones ovate-lanceolate or ovate, very glaucous. *h.* 1ft. 1858. (B. M. 5045, under name of *P. Jaffrayanus.*)

P. baccharifolius (Baccharis-leaved).* *fl.* scarlet, showy, paniculate; corolla enlarged above, the upper lip sub-erect, the lower one reflexed. September. *l.* coriaceous, oblong, in rather distant pairs, nearly sessile, rigidly and acutely dentate. *h.* 1½ft. 1848. A well-marked, showy, half-hardy sub-shrub. (B. M. 4627.)

P. barbatus (bearded).* *fl.* varying from light pink-red to carmine; corolla tubular, the upper lip erect and concave, the lower deflexed and bearded at the throat; panicle twiggy, loose-flowered. July. *l.* entire; cauline ones sessile, lanceolate or linear-lanceolate. *h.* 3ft. 1794. Plant tall, many-flowered. See Fig. 76. (B. R. 1839, 21, a flesh-coloured variety, *carneum.*) SYNS. *Chelone barbata* (B. R. 116), *C. ruelloides* (A. B. R. 34).

FIG. 77. UPPER PORTION OF PLANT OF PENTSTEMON DIFFUSUS.

P. b. Torreyi (Torrey's).* *fl.* deep scarlet-red; throat of corolla naked or very slightly bearded; lips somewhat longer than in the type. Half-hardy. SYN. *P. Torreyi.*

P. breviflorus (short-flowered).* *fl.*, corolla yellowish or flesh-coloured, pink-striped within, about ½in. long, the upper lip beset with viscid hairs; thyrse narrow, many-flowered, raceme-form. September. *l.* lanceolate or oblong-lanceolate, denticulate,

Pentstemon—*continued.*

seldom (if ever) whorled, 1in. or more long. Branches slender, twiggy. *h.* 3ft. to 6ft. (B. R. 1946.)

P. campanulatus (campanulate).* *fl.* varying in shades of pink, dark purple, violet, &c.; corolla tubular or campanulate-ventricose; sterile filament slightly bearded; panicle elongated, naked, raceme-like, secund. June. *l.*, cauline ones distinctly lanceolate, ovate-lanceolate, or linear, argutely serrated. *h.* 1½ft. 1794. (B. M. 1878, 3884.) SYNS. *P. angustifolius* (B. R. 1122; L. B. C. 420), *P. atropurpureus* (L. B. C. 1429), *P. pulchellus* (B. R. 1138; L. B. C. 1438), *Chelone atropurpurea* (S. B. F. G. 235), *C. campanuloides* (A. B. R. 40), *C. rosea* (S. B. F. G. 230).

P. centranthifolius (Centranthus-leaved). *fl.*, corolla bright carmine, 1in. long, the lobes equal, except that the two upper ones are united higher, and equally spreading, scarcely longer than the breadth of the throat; sterile filament filiform, naked. June. *l.*, lower ones oblong; upper ones obovate or lanceolate, amplexicaul. *h.* 2ft. 1858. (B. M. 5142.) SYN. *Chelone centranthifolia* (B. R. 1737).

P. Cobæa (Cobæa-flowered). *fl.* varying from dull reddish-purple to whitish; corolla 2in. long, inflated and broadly campanulate above the calyx, glabrous within; panicle few-flowered, viscous-pubescent. August. *l.* ovate or oblong, argutely serrated or denticulated. *h.* 1ft. (rarely 2ft.). 1835. Plant viscous-puberulous, half-hardy perennial. (B. M. 3465.)

P. confertus (crowded-flowered).* *fl.* sulphur-colour, densely glomerate; sepals sometimes terminating in a long point; corolla narrow, nearly ½in. long; cymes often sessile. July. *l.* highly glabrous, usually entire; cauline ones lanceolate or oblong. *h.* 6in. to 18in. 1827. Plant very glabrous, strict. (B. R. 1260.)

P. c. cæruleo-purpureus (bluish-purple). *fl.* with a bluish-purple corolla and very variable sepals. (B. M. 2954 and L. B. C. 1616, under name of *P. procerus*—an inappropriate one, as the plant is ordinarily one of the lowest of the genus.)

P. cordifolius (cordate-leaved).* *fl.* bright scarlet, profusely produced; corolla tube about 1in., and lips ½in. long, tubular-cylindrical; sterile filament densely bearded. June. *l.* ovate or sub-cordate, usually denticulate or sparsely dentate, scabrid, with the veins impressed above. 1848. Plant sarmentose, and also climbing like a Lonicera, pruinose-puberulous or glabrous. Half-hardy sub-shrub. (B. M. 4497.)

P. crassifolius (thick-leaved). A synonym of *P. Menziesii Douglasii.*

P. deustus (blasted).* *fl.* yellowish, crowded; corolla ½in. long, the tube slightly enlarged; sterile filament glabrous; cymes pedunculate. July. *l.* usually laciniately or pectinately serrate; cauline ones oblong or lanceolate. *h.* 1ft. 1827. Plant glabrous. (B. R. 1318.)

P. diffusus (diffuse).* *fl.* purple, showy, in dense cymelets; corolla less than 1in. long; sterile filament bearded at apex; panicle often leafy. September. *l.* ovate or ovate-lanceolate; upper ones somewhat cordate-amplexicaul, thick, serrated. Stem ascendent. *h.* 1½ft. 1826. Plant puberulous. See Fig. 77. (B. M. 3645; B. R. 1132.) "*P. argutus* (P. M. B. vi. 271) appears to be a form of this, connecting with *P. Richardsonii*" (Asa Gray).

P. Eatoni (Eaton's).* *fl.* rich crimson-scarlet, disposed in terminal panicles; corolla widening towards the mouth, the lobes nearly equal. *l.*, lower ones broadly ovate. *h.* 1½ft. California, 1883. One of the best plants of the genus.

P. erianthera (woolly-anthered). A synonym of *P. glaber.*

P. glaber (smooth).* *fl.* purple, violet, or blue, thyrsoid-paniculate, showy; corolla ventricose-ampliate; sterile filament shortly hairy towards the apex. August. *l.* entire, often glaucescent; cauline ones sessile, lanceolate or ovate-lanceolate. *h.* 6in. to 12in. 1811. Plant highly glabrous. (B. M. 1672.) SYNS. *P. erianthera, P. Gordoni* (B. M. 4319).

P. g. cyananthus (Cyananthus-like). *fl.* in a large, dense thyrse. *l.* broad, cordate-ovate; upper cauline ones acuminate. *h.* 3ft. (B. M. 4464, under name of *P. cyananthus*).

P. glabrus stenosepalus (glabrous, narrow-sepaled). A synonym of *P. glaucus stenosepalus.*

P. glandulosus (glandular). *fl.* violet or lilac, showy, large; corolla swollen above, with the limb shortly bilabiate; inflorescence paniculate. June. *l.* ample, slightly serrated; upper ones cordate-amplexicaul. *h.* 1½ft. 1827. Plant viscous-pubescent. (B. M. 3688; B. R. 1262.) SYN. *P. staticifolius* (B. R. 1770).

P. glaucus (glaucous). *fl.* dull lilac or violet-purple, disposed in a somewhat compact thyrse; corolla less than 1in. long, enlarged above the base, with an ample throat. July. *l.* more or less glaucous; radical ones sub-ovate; cauline ones lanceolate or ovate-lanceolate, dilated at base. *h.* 9in. to 12in. 1827. (B. R. 1286.)

P. g. stenosepalus (narrow-sepaled). *fl.*, sepals lanceolate, long-acuminate; thyrse short, compact. SYN. *P. glabrus stenosepalus.*

P. Gordoni (Gordon's). A synonym of *P. glaber.*

P. gracilis (slender).* *fl.* lilac-purple, or sometimes whitish, ¾in. to 1in. long, tubular-funnel-shaped or almost cylindric; peduncles

Pentstemon—*continued.*

two to several-flowered. August. *l.*, cauline ones mostly linear-lanceolate, 1in. to 3in. long, sometimes serrated; radical ones spathulate or oblong. Stems slender, 1ft. or less high. 1824. (B. M. 2945; L. B. C. 1541.)

P. grandiflorus (large-flowered). *fl.* purple, very showy; corolla 1½in. long; sterile filament hooked, shortly dilated and very slightly bearded at apex; cymelets two to five-flowered; pedicels shortened. July. *l.* all distinct; cauline ones, especially the upper ones, round, amplexicaul, or connate-perfoliate. *h.* 3ft. 1811.

FIG. 78. UPPER PORTION OF PLANT OF PENTSTEMON HARTWEGI.

P. Hartwegi (Hartweg's).* *fl.* scarlet or blood-colour; corolla shortly dilated upwards, 2in. long, tubular-funnel-shaped, with spreading lobes; peduncles two or three-flowered, elongated. June. *l.* lanceolate, or the upper ones dilated at base, amplexicaul, ovate-lanceolate, acuminate, entire. *h.* 2ft. 1825. See Fig. 78. (B. M. 3661 and B. R. 1838, 3, under name of *P. gentianoides.*)

P. heterophyllus (variable-leaved).* *fl.* pink or rose-purple; corolla more than 1in. long, ventricose-funnel-shaped above, the limb shortly bilabiate; racemes twiggy; peduncles one, rarely two, flowered. July. *l.* entire; cauline ones linear-lanceolate or narrow-linear, attenuated at base. *h.* 1½ft. 1834. Plant highly glabrous or pruinose-puberulous, scarcely glaucous. (B. M. 3853; B. R. 1899.)

P. hirsutus (hairy). A synonym of *P. pubescens.*

P. humilis (dwarf). This species is closely related to *P. gracilis.* It differs, however, in the corolla being saturated with blue, and shorter, thyrse more upright; leaves paler; and habit dwarfer (3in. to 9in. high). 1874. (B. M. 6122.)

P. labrosus (large-lipped). *fl.* 1½in. long, horizontal or ascending; corolla scarlet, with lobes half as long as the narrow tube; panicle of long, slender, loose-flowered racemes. August. *l.*, lower ones 4in. to 5in. long by ¼in. to ½in. broad, narrowly oblanceolate, narrowed into the petiole, quite entire, obtuse or sub-acute; upper leaves shorter, quite linear. Stem 3ft. to 4ft. high, red-purple below. 1884. (B. M. 6738.)

P. lævigatus (polished). *fl.*, corolla white, commonly tinged with purple, about 1in. long, abruptly campanulate-inflated above the tube; sterile filament thinly bearded above. Summer. *l.* firm, and somewhat glossy; cauline ones ovate or oblong-lanceolate, with subcordate, clasping base. *h.* 2ft. to 4ft. (B. M. 1425.)

Pentstemon—*continued.*

P. l. Digitalis (Foxglove-like). *fl.* white; corolla upwards of 1in. long, the tube narrowed from above, ampliate-campanulate; sterile filament sparsely bearded; thyrse naked, loose, many-flowered. August. *l.* scarcely serrulate; cauline ones 3in. to 6in. long, lanceolate, or the upper ones ovate-lanceolate, perceptibly attenuated. *h.* 1ft. 1824. (B. M. 2587.) SYN. *Chelone Digitalis* (S. B. F. G. 120).

P. Mackayanus (Mackay's). A synonym of *P. pubescens.*

P. Menziesii Douglasii (Menzies', Douglas' var).* *fl.* lilac-purple, pink-red at base; corolla shortly bilabiate, with an enlarged throat; inflorescence racemose. June. *l.* thickly coriaceous, rather small, entire, usually obovate-lanceolate. *h.* 1ft. (B. R. xxiv. 16, under name of *P. crassifolius.*) The typical plant, *Menziesii*, has not been introduced.

P. M. Scouleri (Scouler's). *fl.* purple. May. *l.* obovate-lanceolate or oblanceolate, mostly argutely serrated. *h.* 3ft. 1827 (B. R. 1277, under name of *P. Scouleri.*)

P. Murrayanus (Murray's).* *fl.* red, showy, on slender pedicels; corolla 1½in. long, enlarged from below; sterile filament highly glabrous, hooked, and shortly dilated at apex. August. *l.*, upper or cauline ones connate, orbicular. *h.* 2ft. to 3ft. 1835. (B. M. 3472.)

P. ovatus (ovate). *fl.* purplish-blue, somewhat clustered; corolla tube scarcely enlarged; sterile filament bearded at apex. July. *l.* ovate or ovate-lanceolate, often argutely toothed; upper cauline ones sub-cordate at base and amplexicaul. *h.* 4ft. 1826. Plant puberulous. (B. M. 2903; S. B. F. G. ser. ii. 211.)

P. Palmeri (Palmer's). *fl.* pale purple, on slender pedicels; corolla broadly ampliate-campanulate above the calyx; panicle naked, raceme-like, twiggy, loose-flowered; peduncles two or three-flowered. Summer. *l.* lanceolate-ligulate, argutely denticulate, and, as well as the stem, glaucescent; upper ones semi-amplexicaul; lower ones spathulate, attenuated into the petioles. *h.* 1½ft. 1873. (B. M. 6064.)

P. pubescens (downy).* *fl.* dull violet or purple, or partly whitish, disposed in a loose-flowered thyrse; corolla enlarged above, and shortly obcompressed; sterile filament long, and densely bearded. August. *l.*, cauline ones linear- or ovate-lanceolate, the uppermost ones reduced to small bracts. *h.* 1ft. to 3ft. 1834. Plant viscous-pubescent or almost glabrous. SYNS. *P. hirsutus* (B. M. 1424), *P. Mackayanus.*

P. pulchellus (pretty). A synonym of *P. campanulatus.*

P. Richardsonii (Richardson's). *fl.* violet, disposed in a loose panicle; corolla 1in. long; sterile filament slightly bearded at apex. July. *l.* ovate-lanceolate or narrow-lanceolate, incised or laciniate-pinnatifid. Stem usually branched; branches spreading. *h.* 1½ft. 1825. Plant almost glabrous. (B. M. 3391; B. R. 1121; L. B. C. 1641.)

P. spectabilis (remarkable). *fl.* bluish-purple; corolla 1in. long, the tube inflated above, the lobes very broad and much spreading; sterile filament glabrous; cymelets three to nine-flowered, pedunculate; panicle loose, elongated. June. *l.* thick, ovate-lanceolate, coriaceous; upper cauline ones amplexicaul, connate. *h.* 2ft. 1816. Plant highly glabrous. (B. M. 5260.)

P. staticifolius (Statice-leaved). A synonym of *P. glandulosus.*

P. Torreyi (Torrey's). A synonym of *P. barbatus Torreyi.*

P. triphyllus (three-leaved). *fl.* violet, disposed in a loose, leafy panicle; corolla ½in. long, slightly enlarged above; sterile filament densely bearded. July. *l.* lanceolate or linear, few-toothed or pinnatifid; lower ones ternate or quaternate, upper ones sometimes opposite. *h.* 1½ft. 1827. Plant almost glabrous, branched. (B. R. 1245.)

P. venustus (charming).* *fl.* purple; corolla upwards of 1in. long, dilated upwards from a narrow tube; sterile filament densely bearded at apex, the lobes ciliated; panicle thyrsoid, rather loose. June. *l.* ovate, or ovate-lanceolate; upper ones sub-cordate, amplexicaul, thickly serrated. Stem ascendent. *h.* 2ft. 1827. Plant puberulous. (B. R. 1309.)

P. Wrightii (Wright's). *fl.* rosy-red; corolla less than 1in. long, dilated-ventricose above, with an ample limb of round, much-spreading lobes; sterile filament long, and densely bearded; cymelets or panicles loose, twiggy, few-flowered. June. *l.*, lower ones oblong; upper ones sub-obovate or lanceolate, amplexicaul *h.* 2ft. 1850. (B. M. 4601.)

Varieties. The seedling or garden varieties of *Pentstemon* have now attained a high degree of excellence, and, as they are so readily raised, other additions are annually made, which represent improvement in form, size, or colour-markings, the result of selection, which the florist or specialist is rigidly prosecuting. The garden varieties are principally the offspring of *P. Cobæa* and *P. Hartwegi*, though other species may also have had something to do with the origin. Subjoined is a selection from the best varieties in cultivation. Many of the old ones are now of sufficient merit to hold their own against new comers.

L

Pentstemon—*continued.*

AGNES LAING, dark rose, throat fine white; splendid form. ALEXANDER TOD, rosy-pink, throat blotched, dense panicle; extra fine. AMELIA, rosy-salmon, mouth and throat dark blotched, large flowers. ARCHIBALD FORBES, magenta, throat white, slightly pencilled, large flower and panicle. BLACK KNIGHT, maroon, throat shaded white; good form; a fine variety. BRIDESMAID, French white, tipped pink; an acquisition. CANDIDATE, bright carmine-scarlet, throat white, lobes belted rose; extra fine. DECISION, magenta-crimson, throat white, pencilled crimson; large and fine. DIANE, dark violet-rose, throat veined and spotted purple. ECCENTRIC, crimson, throat white, blotched and pencilled. E. J. LOWE, vivid scarlet, throat finely pencilled. FLEURON, deep red, tinted crimson and maroon, throat pure white, heavily pencilled; distinct. GEORGE M'ROBERT, puce-purple, throat blotched, close panicle; distinct and fine. H. CANNELL, bright rose, throat pure white, heavily pencilled crimson-maroon; large flowers and panicle. HELEN WOOD, purplish-crimson, throat white, slightly pencilled. JAMES BEGG, carmine-magenta, throat white; large open flower; very showy. JAMES THOMSON, bright vermilion, throat white; very fine. JESSIE FORBES, reddish-purple, throat pure white, heavily pencilled crimson. KING OF PENTSTEMONS, violet-purple, throat white, pencilled; flowers large, and of fine form. LADY MARGARET, maroon, throat white, heavily pencilled, fine panicle. MISS F. HOPE, pure white, slightly suffused pink; one of the best of its class. MISS HAMPTON, mulberry, throat blotched, pure white spot; fine. MISS WATSON, maroon-purple, throat chocolate, pencilled and spotted white; very fine. MRS. ALEXANDER M'KINNON, mauve-crimson, throat white, finely pencilled crimson. MRS. GREEN, rose, throat pure white; extra. MRS. MANN THOMSON, blue, throat pure white; large, and very showy. MRS. NIXON, dark mauve-purple, throat pure white; large flower. MRS. STYLES, tube dark lilac, mouth claret; large flower. PILRIG PARK, rosy-purple, throat blotched, fine panicle; extra. P. KLEIN, bright purplish-pink, throat pure white; flowers large and fine. PROGRÈS, rosy-crimson, throat pure white, pencilled; extra. ROBERT DODDS, reddish-crimson, throat pure white; very fine. ROBERT WARD, scarlet, throat blotched; extra. THE CLOWN, rosy-red, throat white, beautifully marbled crimson; fine. THE FAVOURITE, carmine-rose, throat pure white, pencilled deep red; large flowers and panicle. WILLIAM MILLER, cherry-crimson, throat white, heavily blotched chocolate.

PENTSTERIA. A synonym of **Torenia** (which *see*).

PENTZIA (named by Thunberg, in honour of his pupil, Charles John Pentz). ORD. *Compositæ*. A genus comprising ten species of small, hoary, pubescent, glandular, or glabrous, greenhouse shrubs, indigenous to South Africa. Flower-heads yellow, homogamous, corymbose at the tips of the branches, or solitary on long peduncles; achenes glabrous, often glandular; involucre ovoid or hemispherical; receptacle flat or convex. Leaves alternate, often small, cuneate, toothed, incised or dissected. For culture of *P. flabelliformis*, probably the only species introduced, *see* **Tanacetum.**

P. flabelliformis (fan-leaved). *fl.-heads* yellow, disposed in a simple corymb. May to August. *l.* deltoid, serrated at apex, of a pale hue. *h.* 2½ft. 1774. (B. M. 212, under name of *Tanacetum flabelliforme.*)

PEONY. *See* **Pæonia.**

PEPERIDIUM. A synonym of **Renealmia** (which *see*).

PEPEROMIA (from *Peperi*, Pepper, and *omoios*, similar; in allusion to its close relation to that plant). Pepper Elder. Including *Micropiper*. ORD. *Piperaceæ*. A vast genus (nearly 400 species have been described) of mostly stove, annual or perennial, herbaceous plants, usually fleshy and creeping, broadly dispersed over the warmer regions of the globe, but mostly American. Flowers minute, variously disposed, scattered and crowded; perianth wanting; stamens two. Leaves alternate, opposite, or verticillate, entire, slightly fleshy, succulent, or slender and membranous, often pellucid-dotted; stipules none. Peperomias are very interesting, small-growing, ornamental-leaved plants, suitable for culture in small pots; some of the species that are of trailing habit are also well adapted for hanging baskets. Although, properly, the species described below are stove subjects, they may be placed in vases for the temporary decoration of the sitting-room, as their stout, succulent leaves enable them to successfully withstand the change. They should be grown in good, fibrous peat and

Peperomia—*continued.*

loam, with the addition of some silver sand. Shade from sunshine throughout the summer is requisite; but an abundance of light should be allowed in dull weather, and shading dispensed with altogether in winter. Propagated by cuttings, and by seeds when obtainable. Cuttings consisting of short pieces of the shoots, or single joints with a leaf attached, root readily in spring, if inserted in pans of sandy peat; these should be plunged in a propagating house, but not in a frame: they are liable to damp off if confined. Keep shaded, and only a little moist, until roots are formed. Even when established, Peperomias do not require so much water as many stove subjects. The species described below are grown for the beauty of their foliage. They are perennials except where otherwise specified.

P. arifolia (Arum-leaved). *l.* variegated green and grey, ovate, acuminate. Brazil, 1864.

P. a. argyreia (silver-striped). A synonym of *P. Saundersii.*

P. Botterii (Botteri's). *fl.* borne in slender, cylindrical catkins. *l.* ovate, pubescent, growing in whorls of three. Stems slender, sparingly branched. Mexico, 1869. (Ref. B. 211.)

P. brevipes (short-stalked). *l.* beautifully variegated with brown and light green, round, on long, thread-like stems. 1879. A pretty and slender-growing basket-plant. SYN. *P. prostrata* (of gardens). (G. C. n. s., xi. 717.)

P. clusiæfolia (Clusia-leaved).* *fl.*, peduncles terminal, smooth, red, bearing one or two long, cylindrical spikes. May. *l.* 4in. to 6in. long, between coriaceous and fleshy, shortly petiolate, obovate, tapering downwards and somewhat auricled at the very base, concave and channelled above, the margins dark red and recurved, the extremity often emarginate. Stems much-branched, red, wrinkled, decumbent at base. *h.* 1ft. West Indies, 1817. Evergreen. (B. M. 2943.)

P. eburnea (ivory-petioled). *l.* of a brilliant green, veined with emerald-green, borne on finely tomentose petioles of an ivory-white. *h.* 12in. to 15in. New Grenada, 1871. A beautiful perennial, of close, tufted habit.

P. incana (hoary). *fl.*, catkins terminal, elongated, thrice as long as the leaves, dense-flowered. February. *l.* petiolate, orbicular, slightly cordate, or ovate, thick, fleshy, opaque, white-tomentose on both sides, shining above. *h.* 1ft. Brazil, 1815. A white-tomentose, fleshy sub-shrub. (H. E. F. 66.)

P. maculosa (spotted).* *l.* very fleshy, ovate-lanceolate, bright shining green; petioles beautifully spotted with purple. Tropical America, &c.

FIG. 79. PEPEROMIA MARMORATA, showing Habit and detached Inflorescence.

P. marmorata (marbled).* *fl.* in an erect, tail-like catkin. *l.* of a rich bright green, beautifully variegated with white, the colours somewhat marbled or reticulated; thick, fleshy, somewhat ovate, acuminated. South Brazil, 1866. An elegant species. See Fig. 79. (B. M. 5568.)

P. microphylla (small-leaved). *fl.* in short, terminal spikes. *l.* small, obovate-oblong, usually in whorls of four. Stems slender, succulent, much-branched. Mexico, 1869. Trailer. (Ref. B. 41.)

P. nummulariæfolia (Moneywort-leaved).* *fl.* in terminal spikes. *l.* alternate, roundish, stalked, similar to those of

Peperomia—*continued.*

Nummularia. Stems thread-like, fleshy, much branched, creeping to an indefinite length. Jamaica, &c., 1866. This species is eminently adapted for covering the sides of hanging baskets. (Ref. B. 13.)

FIG. 80. PEPEROMIA SAUNDERSII.

P. obliqua (oblique). *fl.* in dense, axillary and terminal catkins. *l.* shortly petiolate, oblique, oblong-ovate, attenuated at apex, acute, glabrous, fleshy. Peru. (B. M. 1882, as *Piper acuminatum.*)

P. peltæformis (shield-like). *l.* dark green, marked with a few longitudinal bands of grey, thick, ovate, poised on a somewhat slender stalk, peltately attached. Brazil, 1864.

Peperomia—*continued.*

P. Saundersii (Saunders').* *l.* orbicular or ovate, about 5in. long, thick and fleshy, the colour along the veins bright green, the interstices being a metallic white. *h.* 8in. to 10in. Brazil, 1866. A handsome plant, of very compact habit. SYNS. *P. arifolia argyreia* (B. H. 1867, 2; B. M. 5634) and *P. Verschaffeltii* (I. H. 598). See Fig. 80.

P. velutina (velvety). *l.* dark green, longitudinally ribbed and banded with grey. Stems red, fleshy. Ecuador, 1872. (I. H. n. s. 89.)

P. Verschaffeltii (Verschaffelt's). A synonym of *P. Saundersii.*

PEPINIA. Included under **Pitcairnia** (which *see*).

PEPLIS (an old Greek name given by Dioscorides to *Euphorbia Peplis*, and by others to *Portulaca*). ORD. *Lythrarieæ.* A genus comprising three species of small, hardy, annual herbs, natives of Europe, North Africa, and temperate Asia. Flowers axillary, sessile, solitary, minute, minutely bibracteolate; calyx lobes and petals six, rarely five. Leaves alternate or opposite, obovate or linear-oblong, entire. The species are of little or no horticultural value. *P. Portula* is a common weed, found in moist places in Britain.

PEPO. "A one-celled, many-seeded, inferior fruit, with parietal placentæ and a pulpy interior, as a Gourd" (Lindley).

PEPPER. *See* **Piper.** The name is also applied to several other plants.

PEPPER, BIRD. *See* **Capsicum baccatum.**

PEPPER ELDER. A name applied to *Peperomia* and various species of *Piper.*

PEPPERIDGE. A common name for *Nyssa multiflora.*

PEPPERMINT. *See* **Mint.**

PEPPERMINT-TREE. A common name for several species of *Eucalyptus.*

PEPPER SAXIFRAGE. *See* **Silaus pratensis.**

FIG. 81. BRANCH OF PERESKIA GRANDIFOLIA (page 76).

P. prostrata (prostrate). A garden name of *P. brevipes.*

P. pubifolia (downy-leaved). *l.* marked with a central grey bar, small, ovate, fleshy in texture. 1865. A pretty, perennial creeper, suitable for basket culture.

P. resedæflora (Reseda-flowered). *fl.* white, fragrant, collected into numerous divaricate, filiform, clavate, and sulcately nodose catkins, which form erect, pyramidal, loose, terminal panicles. *l.* dark green, entire, cordate-orbicular; radical ones rosulate and long-stalked; cauline ones irregularly whorled. New Grenada, 1870. (B. M. 6619; I. H. ser. iii. 26.)

PEPPERWORT. *See* **Lepidium.**

PERALTEA. Included under *Brongniartia.*

PERAMIUM. A synonym of *Goodyera.*

PERANEMA. Included under **Sphæropteris** (which *see*).

PERDICIUM (in part). A synonym of **Trixis** (which *see*).

PEREIRIA. A synonym of **Coscinium** (which *see*).

PERENNIALS. Plants which last for several years are termed Perennials. The term is in most general use in referring to hardy border plants, where it is necessary to distinguish between those which are perennial, and others that are only of annual or biennial duration.

PERESKIA (named after Nicholas F. Peiresk, senator of Aix, in Provence, who collected a considerable library and herbarium). Barbados Gooseberry. SYN. *Peirescia.* ORD. *Cactæ.* A genus comprising about thirteen species of stove, woody shrubs or trees, with terete, leafy branches; they are natives of tropical America and the West Indies. Flowers solitary or paniculate, terminal or lateral, sessile or pedunculate; petals broad, expanded in a rose-like manner; calyx tube equal with the ovary, and divided into leafy segments; stamens numerous, free, shorter than the petals; the thread-like style bearing a many-rayed stigma. Fruit pear or egg-shaped, with a broad scar at the top, surrounded by the leafy segments of the calyx. Leaves fleshy, sessile or stalked, flat or semi-cylindrical, veined, pulvilligerous in the axils, the pulvillæ armed. Pereskias are chiefly of use for affording stocks on which to graft Epiphyllums and other Cacti. *P. aculeata* is most extensively used, while *P. Bleo* is more vigorous and better adapted for tall stocks. The latter is rather a fine decorative stove plant when in flower. Cuttings strike readily in heat; they should be inserted in very sandy soil, and kept rather dry. The plants succeed in sandy loam, to which a little brick rubbish should be added.

P. aculeata (prickly).* American or Barbados Gooseberry. *fl.* white, rather panicled. October. *fr.* globose, with narrow sepals, edible. *l.* elliptic. Prickles one or two, recurved at the downy base of the petiole. Stem armed with fascicled, straight spines. *h.* 5ft. to 7ft. West Indies, 1696. Shrub. (B. R. 1928.)

P. Bleo (Bleo).* *fl.* pale red (the stamens also red, but white at the base), two to four together at the tops of the branches, each on a short peduncle. October to January. *l.* oblong, acuminated. Prickles axillary, five or six in a fascicle. *h.* 8ft. to 10ft. New Grenada, 1827. Shrub. (B. M. 3478; B. R. 1473.)

P. grandiflora (large-flowered). A synonym of *P. grandifolia.*

P. grandifolia (large-leaved).* *fl.* white, somewhat panicled, solitary. August. *l.* oblong-lanceolate, smooth above, beset with rough dots beneath. Stem very spiny; larger spines blackish, 2in. long. *h.* 6ft. Brazil, 1818. Shrub. SYN. *P. grandiflora.* See Fig. 81, page 75.

P. Pititache (Pititache). *fl.* white. September. *l.* fleshy, lanceolate-ovate. Trunk woody, erect, very spiny; branches sub-horizontally divergent; areolæ approximate, tomentose; prickles three to six, unequal, rigid. *h.* 3ft. Mexico, 1838. Shrub.

FIG. 82. PERESKIA PŒPPIGII.

P. Pœppigii (Pœppig's). *l.* cylindrical, green. Stem low, upright, thin, cylindrical, irregular; spines white, strong, generally in threes, the central one being longest. Chili. See Fig. 82.

P. portulacæfolia (Portulaca-leaved). *fl.* purple, solitary, terminal; petals roundish. *fr.* umbilicate, globose, retuse, greenish, with white flesh, and numerous black seeds. *l.* obovate-cuneate. Prickles solitary under the leaves, but fasciculate on the stems, blackish. *h.* 20ft. to 30ft. West Indies, 1820. Tree.

PEREZIA (called after Lazarus Perez, an apothecary at Toledo, who wrote, in 1575, a history of drugs). Including *Dumerilia* (of Lessing) and *Homoianthus.* SYN. *Clarionea.* ORD. *Compositæ.* A genus comprising

Perezia—*continued.*

about forty-six species of greenhouse, half-hardy, or hardy herbs, sometimes stemless or tufted, sometimes erect and branched; they are natives of extra-tropical South America or the Andes, Central America, Mexico, and California, and a few are found in Brazil. Flower-heads purple, pink, blue, or white, homogamous, rather large, on a one-headed, leafless scape, or sometimes mediocre, or smaller, and clustered or loosely paniculate at the apices of the stems; involucre ovoid, campanulate or turbinate; receptacle flat, naked or pilose. Leaves radical or alternate, entire, toothed, pinnatifid or dissected; lobes toothed, sometimes spiny-ciliate. Few of the species are known to cultivation. For culture, *see* **Aster.**

P. viscosa (clammy). *fl.-heads* purple; pappus reddish; receptacle piloso-fimbrilliferous; involucral scales biseriate, entire, sub-equal, mucronulate. June. *l.*, radical ones oblong-cuneate, obtuse, sinuate, acute, somewhat glandular; cauline ones sessile. Stem erect, almost naked or glandular. *h.* 1½ft. Chili, 1862. Hardy. (B. M. 5401, under name of *Homoianthus viscosus.*)

PERFECT. A term more particularly applied to hermaphrodite flowers.

PERFOLIATE. When the stem appears to pass through the substance of a leaf, owing to the union of its amplexicaul lobes.

FIG. 83. DOUBLE PERIANTH, as seen in Flower of *Abutilon insigne.*

PERGAMENEOUS. Resembling parchment in texture.

PERGULARIA (from *pergula* an arbour; referring to the twining character of the plants). ORD. *Asclepiadeæ.* A genus comprising about ten species of stove, evergreen, glabrous climbers, inhabiting tropical Asia and Africa and Southern Africa. Flowers golden-yellow or greenish; calyx five-partite; corolla salver-shaped, with an ovoid or oblong tube; staminal corona five-leaved. Leaves opposite, membranous. For culture, *see* **Stephanotis.**

P. minor (smaller). *fl.* orange-coloured or yellow, very fragrant; umbels shorter than the leaves. May to August. *l.* orbicular or ovate-cordate, acuminate, downy while young. India, China, &c., 1790. (A. B. R. 184; B. M. 755.)

P. odoratissima (sweetest-scented).* West Coast Creeper. *fl.* greenish-yellow, exceedingly fragrant; umbels shorter than the leaves; corolla woolly inside. June. *l.* cordate, acuminated,

Pergularia—*continued.*

soft, downy, 4in. long. China, &c., 1784. (A. B. R. 185; B. R. 412.)

P. sanguinolenta (bloody-juiced). *fl.* greenish-yellow; cymes many-flowered, shorter than the leaves. July. *l.* ovate-lanceolate, quite glabrous. Sierra Leone, 1822. Plant trailing, full of blood-coloured juice. (B. M. 2532.)

PERI. Greek for around; *e.g.*, as in Perianth.

PERIANTH. The outer, or accessory, organs in the flower, *i.e.*, the sepals and petals, which protect the essential organs of reproduction, or the *true* flower, in

FIG. 84. PETALOID PERIANTH, as seen in *Lilium concolor pulchellum.*

botanical language, *i.e.*, the stamens and pistil. In most flowers, the perianth is *double*, consisting of an outer circle of green sepals, and an inner circle of coloured

FIG. 85. SINGLE PERIANTH, as seen in *Anemone sylvestris.*

petals (as in *Abutilon*, Fig. 83). In the *Liliaceæ*, and other plants, the perianth, though double, consists of parts very much alike, and all petaloid (*Lilium concolor*, Fig.

Perianth—*continued.*

84); while in others—*e.g.*, *Juncus*, &c.—all the parts are sepaloid. Often one of the circles is wanting, and the missing circle is usually the petals, though (as in *Anemone*, Fig. 85) those present may appear petaloid. Often such *single* perianths are sepaloid (*Mercurialis*). In a good many plants (Willows, *Arum*), there is no trace of perianth. In many plants, the bracts are modified to simulate part of a perianth (sepaloid bracts of *Dianthus*, and petaloid bracts of *Cornus suecica*).

PERIBŒA. Included under **Hyacinthus** (which *see*).

PERICALLIS. Included under **Senecio** (which *see*).

PERICALYMNA. Included under *Leptospermum.*

PERICARP. The rind or shell of all fruits.

PERICLADIUM. The sheathing base of a leaf when it expands and surrounds the supporting branch; the dilated, sheathing base of some petioles.

PERICLINIUM. The involucre of the flower-heads in *Compositæ.*

PERICYCLA. A synonym of **Licuala** (which *see*).

PERIDERM, PERIDERMIS. The outer cellular layer of bark, below the epidermis.

PERIDERMIUM from *peri*, around, and *derma*, skin). A group of Fungi, including only a few forms, parasitic on *Coniferæ.* Those of most importance are *P. elatinum* (also called *Æcidium elatinum*), which gives rise to swellings on the branches of the Silver Fir (*Abies pectinata*), and *P. Pini*, with its variety *P. acicolum*, on the Scotch Fir (*Pinus sylvestris*) and the Austrian Fir (*P. austriaca*), in pleasure grounds, as well as in forests. The genus belongs to the group of "red rusts," and the Fungi in it form a mycelium in the tissues of the leaves and branches of the host-plants. On the surface of the diseased parts there appear, after a time, cylindrical, laterally flattened, or conical outgrowths, called peridia, $\frac{1}{10}$in. to $\frac{1}{4}$in. high, and $\frac{1}{20}$in. to $\frac{1}{4}$in. broad; the larger forms being on the branches, and the smaller on the needles. These outgrowths are formed of a thin layer of cells, which tears irregularly at the tip, and sets free numerous small, round, orange-coloured spores, to reproduce the plant.

P. (*Æcidium*) *elatinum* is not very frequent; but where it is present the tree sometimes bears a large number of swellings on the branches, often near the base of one or more small branches, or supports what are known as "witch-besoms" on the larger branches. Both kinds of growth are the work of the Fungus; and the difference is due chiefly to age. The swellings vary from the size of a Hazel nut to that of a closed fist; the bark is the part most enlarged. The mycelium grows in the bark and the pith-rays and pith, and often causes separation of the bark from the wood, and the death of the wood in patches. In most cases, it does not kill the branch entirely; but the mycelium is perennial, and the growth on the branch continues to increase year after year. When branches grow from the surface, they often branch very freely, but remain stunted; and this is repeated year by year, the "witch-besoms" being thus formed. The leaves on the diseased shoots are short and stunted, and are usually covered with peridia. Though not usually, or only very slowly, dangerous to the life of the tree, the growths are very objectionable, as they greatly spoil its appearance. The only effectual remedy is cutting off the diseased branches as soon as the swellings appear, in order to prevent the disease from spreading to other trees.

P. Pini grows in branches of Firs, and almost always

Peridermium—*continued.*

on trees under twenty years old. The peridia are about ⅛in. or ¼in. long, and ⅛in. high, and are usually flattened on the sides. They are generally crowded (see Figs. 86 and 87), and may occur on the same branch for two or more years in succession; but they ultimately kill the branches. The Fungus is also found on the needles, in a form called *P. acicolum*. The peridia are much smaller in this form, and are more cylindrical, and stand in a row along the needles; but the latter are not so severely injured as the branches. The growth of the mycelium in

FIG. 86. STEM OF YOUNG PINE ATTACKED BY PERIDERMIUM PINI.

the branches causes the conversion of the starch and other food stores in the cells into turpentine and resins, which soak into all the tissues, and at last often appear on the surface of the branches. Investigations by Wolff and others have, of late years, led to the belief that this Fungus is only a stage in the life-cycle of another, named *Coleosporium Senecionis*, which has long been known as a widespread and abundant parasite on the leaves and stems of Groundsels (*Senecio vulgaris* and *S. viscosus*) and of Ragwort (*S. Jacobæa*). The *Coleosporium* forms yellow or orange spots, crowded into

FIG. 87. BARK OF PINUS SYLVESTRIS INVADED BY PERIDERMIUM PINI—*a*, *a*, Young Peridia; *b*, Peridium opened.

irregular patches, or in concentric rings, or scattered over the leaves. These spots are composed of masses of small, orange-yellow spores, covered with fine warts, and nearly round, or cylindrical or clavate in form. Experiments in growing the Fir-parasite from these spores so often fail, that further evidence on their connection is desirable. Almost the only available remedy is to cut off and burn all parts of the trees that show the disease, and to keep the neighbourhood of the trees as clear as possible of species of *Senecio*.

PERIGONE. The same as **Perianth** (which *see*).

PERIGYNOUS. Petals are said to be Perigynous when the disk bearing them is quite free from the ovary, but is more or less combined with the base of the calyx tube.

PERILLA (said to be the Indian name). SYN. *Dentidia*. ORD. *Labiatæ*. A genus consisting of only two or three species of half-hardy, annual herbs, natives of the mountains of India and China. Flowers small, pedicellate; calyx campanulate, five-fid, nodding after florescence, and bilabiate; corolla tube included, limb shortly five-fid; whorls two-flowered, secund, disposed in axillary or paniculate racemes; bracts short, or rarely exceeding the calyx. Leaves usually violet or greenish. The plants thrive in any light, loamy soil, and may be increased by seeds. *P. ocimoides crispa* is sometimes employed in summer bedding. It requires, practically, little attention beyond pinching out the points occasionally, because of its very dark and distinct foliage. Seeds, should be sown in pans or boxes, about the middle of March, and placed in a gentle heat. After being gradually hardened off, the seedlings may be placed in the open border about the end of May. A few well-grown examples of this plant will be found very useful in sub-tropical gardening.

P. heteromorpha (variable-formed). A synonym of *P. ocimoides*.

P. nankinensis (Nankin). A synonym of *P. ocimoides crispa*.

P. ocimoides (Ocimum-like). *fl.* white, numerous; corolla minute; racemes shorter than the leaves. July and August. *l.* broadly ovate, 2in. to 4in. long, acuminate, cuneate at base or narrowed into the rather long petioles, sub-rugose, deeply crenate-serrate. Stem erect, 1ft. to 3ft. high, thick, firm, obtusely tetragonal, sulcate. India, China, &c., 1770. SYN. *P. heteromorpha*. (B. M. 2395.)

P. o. crispa (curled).* A garden form, having dark bronzy-purple leaves, with the margins crisped and fimbriated. China. SYN. *P. nankinensis*.

PERILOMIA (from *peri*, around, and *loma*, a fringe; alluding to the membranous-winged nutlets). ORD. *Labiatæ*. A genus comprising about eight species of greenhouse or half-hardy, loosely or densely branched, sometimes sub-scandent, leafy shrubs, natives of the mountains of South America, extending from Chili or Bolivia to Mexico. Flowers scarlet; calyx campanulate, slightly gibbous at back, bilabiate, with short, entire lips; corolla frequently pubescent or villous, with an exserted, incurved tube, and a short, bilabiate limb; whorls two-flowered, secund, axillary, or the uppermost ones subracemose. Nutlets erect, triquetrous or compressed at back. Leaves dentate; floral ones conformed, or the uppermost ones reduced to bracts. The undermentioned species—the only one introduced—is a very pretty half-hardy evergreen shrub, thriving best in a sandy-peat soil. It may be propagated, in April, by cuttings of young shoots, inserted in sand, under a glass.

P. scutellaroides (skull-cap-like). *fl.* over ½in. long, forming an elongated raceme, 6in. to 12in. long. August. *l.* ovate, crenated, roundly truncate at the base, ½in. to 1½in. long. *h.* 3ft. Peru, 1829. (B. R. 1394, under name of *P. ocimoides*.)

PERIPHANES. A synonym of **Hessea** (which *see*).

PERIPHRAGMOS. A synonym of **Cantua** (which *see*).

PERIPLOCA (from *peri*, around, and *ploke*, a twining; in reference to the intertwining habit of some species). ORD. *Asclepiadeæ*. A genus comprising twelve species of glabrous shrubs, sometimes twining and leafy, sometimes erect, rigid, and aphyllous, inhabiting Southern Europe, temperate Asia, and tropical and sub-tropical Africa. Flowers often brownish or blackish within, greenish outside, in loose cymes. Leaves opposite, glabrous. The undermentioned species is a very desirable plant for covering an arbour or wall, which it does very rapidly. Any moderately good garden soil suits it. Propagated by layers or cuttings, inserted under a glass, during summer and autumn.

Periploca—*continued.*

P. græca (Grecian).* Silk Vine. *fl.* greenish outside, brownish inside, clothed with copious, short hairs; corymbs disposed on long peduncles. July. *l.* varying from ovate to lanceolate, 3in. to 4in. long. South-eastern Europe, Orient, 1597. (B. M. 2289; B. R. 803; S. F. G. 249.)

PERISPERM. The albumen of seeds.

FIG. 88. PERISTERIA CERINA, showing Habit and detached Flowers.

PERISTERIA (from *peristera*, a dove; referring to the dove-like appearance of the column, whence the plant is called, in South America, "Flower of the Holy Spirit"). Dove Flower. SYN. *Echardia.* ORD. *Orchideæ.* A small genus (four species) of stove orchids, having fleshy pseudo-bulbs, natives of the Columbian Andes. Flowers showy, in short or elongated racemes, shortly pedicellate; sepals concave and connate at the base; petals similar, but rather smaller; lip with its lower half continuous with the column, and sagittate at the base, and its upper half articulated with the lower, undivided, and bent down over the face of the column, which is short, fleshy, and wingless; pollen masses two, furrowed, sessile on a narrow gland; scapes simple, erect, nodding, or deflexed at base. Leaves large, plicate. For culture, *see* **Acineta,** to which the present genus is closely allied.

FIG. 89. PERISTERIA ELATA.

Peristeria—*continued.*

P. Barkeri (Barker's). A synonym of *Acineta Barkeri.*

P. cerina (waxy). *fl.* yellow, produced in bunches on pendulous spikes. June. *l.* large, coriaceous, dark green. Pseudo-bulbs strong, two-leaved. *h.* 1ft. Central America, 1835. See Fig. 88. (B. R. 1953.)

FIG. 90. FLOWERS OF PERISTERIA ELATA (natural size).

P. elata (tall).* Dove, or Holy Ghost Flower. *fl.* white, with small lilac specks on the base of the lip, waxy, very sweet-scented, about 1½in. across, almost globose; spikes erect, 3ft. or more in height, and rising from the base of the pseudo-bulbs. July to September, and continuing to produce flowers for two months, when the growths are strong. *l.* lanceolate, strongly ribbed and plicate, sometimes upwards of 3ft. high and 6in. across. Pseudo-bulbs striated, green, as large as swans' eggs, bearing three to five leaves. *h.* 4ft. Panama, 1826. A very handsome, noble, and free-growing plant; the *Espiritu Santo* (Holy Ghost Flower) of the Spaniards. See Figs. 89 and 90. (B. M. 3116.)

P. guttata (spotted). *fl.* yellow and red; spikes produced close to the pseudo-bulbs, pendulous, and hanging over the edge of the pot. September, and remaining two or three weeks in perfection. *h.* 6in. South America, 1837. A curious, rather than showy, species.

P. Humboldtii fulva (Humboldt's tawny). A synonym of *Acineta Humboldtii.*

P. pendula (pendulous).* *fl.* pale yellow, spotted with red and brown; lip crested at the base of the disk, thick; scape short, few-flowered. *h.* 1ft. Demerara, 1855. (B. M. 3479.)

PERISTROPHE (from *peristrophe*, turning round; in reference to the corolla, which is twisted so as to be upside down). ORD. *Acanthaceæ.* A genus comprising about fifteen species of erect or loosely sub-twiggy herbs, inhabiting tropical and Southern Africa, Madagascar, the East Indies, China, and the Malayan Archipelago. Flowers generally purple; heads often pedicellate, loosely cymose; bracts two, sub-connate at base; calyx shorter than the bracts. Leaves entire. The species here described are stove perennials, and are those usually seen under cultivation. For culture, *see* **Justicia.**

P. lanceolaria (lance-leaved). *fl.* in terminal, much-branched panicles; corolla pale purple, with a long, slender tube, which is compressed and slightly twisted at apex; upper lip pale purple-

Peristrophe—*continued.*

white, 1in. long. Winter. *l.* 3in. to 5in. long, lanceolate or oblong-lanceolate, long-acuminate, attenuated into the petiole, glabrous on both surfaces. *h.* 2ft. to 4ft. India. (B. M. 5566.)

P. speciosa (showy).* *fl.*, corolla externally pubescent, with a very long, curved, remarkably twisted, pale purplish tube; lips two, elliptical-oblong, both of a deep, rich carmine-purple. Winter. *l.* opposite, petiolate, ovate, somewhat acuminated, the lower and larger ones sub-cordate and slightly crenate. Stem and old branches ash-colour. *h.* 4ft. India, 1826. (B. 74; B. M. 2722; L. B. C. 1915, under name of *Justicia speciosa.*)

PERISTYLIS. Included under *Habenaria.*

PERITHECIUM (from *peri*, around, and *thékion*, a receptacle; inasmuch as it surrounds the receptacle for the spores). The name given to certain bodies formed, in the processes of reproduction, in a large group of Fungi, the **Pyrenomycetes** (which *see*). The Perithecia vary a good deal in form, and in mode of grouping together; but they are always small, and are usually flask-shaped. They may be almost free from the mycelium, or may be imbedded in it, and, in the latter case, the wall is hardly distinguishable from the mass in which it lies. When free, the wall is often rather brittle, but moderately strong, and is formed of squarish or rounded cells, usually dark brown or black. The Perithecia may be scattered about singly, or crowded on specialised bodies. When mature, each usually contains several long, transparent cells of uniform width, or widened upwards (asci), and in each asous there are generally eight spores, less often from two to six, or an indefinite number, for reproduction. These escape through a narrow neck, in which is a circular pore, or the aperture may be a long slit; or there may not be an aperture, the Perithecia bursting ultimately. Intermixed with the asci in many are numerous slender filaments, as long as the asci. They are the paraphyses, and their presence or absence is of consequence in distinguishing the genera in the group.

PERITOMA (from *peritome*, a cutting round about; referring to the base of the calyx). SYN. *Atalanta* (of Nuttall). ORD. *Cappariderœ*. A small genus of hardy, North American, annual herbs, now included, by the authors of the "Genera Plantarum," under *Cleome*. Calyx four-fid, cut round at the base; stamens six. Capsules stalked. Leaves compound, generally three to five-foliolate. For culture of *P. aurea*, *see* **Cleome.**

P. aurea (golden). *fl.* yellow; petals oblong-elliptic, sub-sessile. July and August. *l.* three to five-foliolate; leaflets oblong-lanceolate, acute at both ends, entire. *h.* 1ft. 1840. The proper name of this plant is *Cleome lutea.* (B. R. xxvii. 67.)

PERIWINKLE. *See* **Vinca.**

PERNETTYA (named after A. J. Pernetty, 1716-1801, who accompanied Bougainville in his voyage, and was author of "A Voyage to the Falkland Islands"). ORD. *Ericaceæ*. A genus comprising about fifteen species (the number is inordinately multiplied by some authors) of hardy, or nearly hardy, rigid, very glabrous, hispid, or ciliated shrubs, some small; one is a native of the mountains of Tasmania and New Zealand, another is Brazilian, and the rest inhabit the mountains of Western America, from Tierra del Fuego to Mexico. Flowers white or rose-colour, small, nodding, solitary in the axils, or disposed in axillary or terminal racemes; calyx five-parted, not changing in the fruit, persistent; corolla urceolate or globose, shortly five-lobed, the lobes recurved; pedicels curved, bracteate and bibracteolate. Fruit a globular berry, varying considerably in colour and size, generally about the size of a pea. Leaves usually small, alternate, short-stalked, serrated, penni-nerved, coriaceous, hard, persistent. The species best known in cultivation are those described below. For culture, *see* **Gaultheria.**

P. ciliaris (ciliated). *fl.* white; peduncles glandular. June. *l.* ovate-lanceolate, acute, having the margins denticulated and ciliated with bristles. Branchlets setose. *h.* 2ft. Mexico, 1849. Half-hardy. (G. C. n. s., x. 39.)

Pernettya—*continued.*

P. furens (maddening).* *fl.* white, in almost sessile, solitary, many-flowered, axillary racemes; lobes of corolla spreading, rather obtuse. March. *l.* alternate, 1½in. long, ovate-lanceolate, rarely sub-obovate, with serrated margins; petioles red. Chili. A low, moderately-branched shrub. (B. M. 4920.)

P. mucronata (mucronate).* Prickly Heath. *fl.* white; pedicels axillary, bracteate, about equal in length to the leaves. May to July. *l.* ovate, cuspidate, denticulate, serrulate, stiff, shining on both surfaces. *h.* 6ft. Magellan, 1828. (B. R. 1675.) SYN. *Arbutus mucronata* (B. M. 3093; L. B. C. 1848). A considerable number of handsome seedling varieties have been produced from this species, varying in the size and colour of the berries, these ranging from almost black to nearly white. Perhaps the finest forms have been raised by Mr. L. J. Davis, Hillsborough, co. Down.

P. m. angustifolia (narrow-leaved). A form with narrower leaves than the type. (B. M. 3889; B. R. 1840, 63, under name of *P. angustifolia.*)

P. Pentlandi (Pentland's). *fl.* white, ¼in. long, ovate-globose, solitary, axillary, drooping; pedicels red. June. *fr.* a berry, about the size of a large pea, dark blue-purple. *l.* crowded or sparse, ¼in. long and under, ovate or ovate-lanceolate, acute, serrulate, very coriaceous, shining. Branches and branchlets angled, setulose or glabrous, leafy. Andes, 1875. A rigid, branched, small shrub. (B. M. 6204.)

P. pilosa (pilose).* *fl.* white; corolla ovate, with blunt, revolute teeth. May. *l.* ovate-elliptic, ciliately serrulated, coriaceous, without mucro, and callous at the point. Stem pilose, procumbent. *h.* 6in. Mexico, 1839. SYN. *Arbutus pilosa.* (B. M. 3177.)

PERNETTYA (of Scopoli). A synonym of *Canarina.*

PERONIA. A synonym of **Thalia** (which *see*).

PERONOSPORA. A genus of minute Fungi, belonging to the "White Moulds," one of the groups included among the mildews. There are many species in the genus, and all of them are parasitic on plants, *i.e.*, they grow in and upon living plants. They prefer the leaves and young stems—at least they are most conspicuous upon these—but they run through all parts, from roots to seeds, though showing themselves usually only on the younger green organs. They are confined to herbs as their hosts, except in one or two cases, *e.g.*, *P. sparsa*, on leaves of Roses. Some of them grow on cultivated herbs in gardens, and are frequently most injurious to these plants. Several of the more destructive species are briefly described below; but a short account of the general structure and modes of reproduction characteristic of the genus must first be given. We select as a type *Peronospora nivea*, which is very common upon the leaves, stems, and roots of wild *Umbelliferœ*, and also upon the garden Carrot, Parsley, and Parsnip. A portion of a leaf attacked by this Fungus may be recognised by its yellowish-green colour above, passing into brown. The lower surface of the patch bears a white coating, which, under the microscope, is seen to consist of erect, branched stalks of very small size. These stalks emerge through the stomata of the leaf. Each is forked once or twice, and bears, towards the tip, from one to four horizontal branches, each forked once, twice, or thrice, and ending in straight, short branchlets. Each of the latter bears on its tip a small cell, called a conidium (see Fig. 91, *a*, *b*). On tracing the erect stalks downwards into the leaf, they are found to arise as branches from an abundant mass of filaments (mycelium) of a Fungus. This mycelium is spread through all parts of the plant, lying in the intercellular spaces, or boring through the cell-walls, and drawing nourishment from the contents of the cells by means of numerous minute suckers (haustoria). The host-plants are soon destroyed by the Fungus, and the diseased parts either dry up, or, if fleshy, *e.g.*, roots and tubers, they become soft, rotten, and pulpy. Reproduction is effected by means of the conidia and of oospores. The conidia do not at once reproduce the Fungus, but, when placed in water, their contents divide (see Fig. 91, *b*), into five or six small, egg-shaped masses, or zoospores, each furnished with two hairs (cilia), which they can move, and thus they can swim in water, *e.g.*, in a dewdrop or raindrop. After

Peronospora—*continued.*

a time, when on a suitable part of the plant, they push out tubes, and these pass through the stomata into the interior of the plant, and there reproduce the Fungus. This is the usual process in summer. The conidia and the zoospores, however, are unfit to resist intense cold; hence, another process of reproduction occurs in autumn, resulting in the formation of the oöspores in the tissues of the host-plants. This latter process is as follows. On two neighbouring branches of mycelium-threads, inside the tissues of the host, two projections begin to form. One of these (oosphere) is globular; the other (antheridium) is oval, or clubbed, and much smaller, and a cell is cut off from the rest, at the end, by a partition. The antheridium comes to lie against the oosphere, and sends into it a kind of beak, which pierces its wall, and fertilises the contents. These contract,

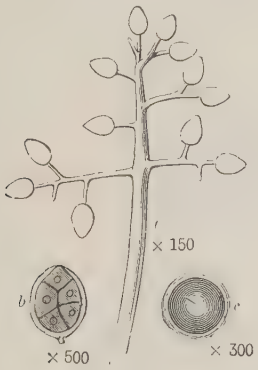


FIG. 91. PERONOSPORA NIVEA—*a*, Part of Conidiophore, with Conidia; *b*, Conidium, inclosing five Zoospores; *c*, Resting Spore.

become covered with a cell wall, and form the oospore (see Fig. 91, *c*). The outer wall of the oospore often bears ridges, or outgrowths, characteristic of the species. The oospores remain unchanged during winter, and in spring they reproduce the Fungus.

Remedy. Owing to the fact that the Fungi live *inside* the host-plants, and only produce their conidia outside them, it is impossible to destroy the parasite without destroying the host. Efforts should be directed against the spread of the disease, since a cure of the diseased plants is practically hopeless. All tissues attacked by *Peronosporæ* are liable to communicate the disease to healthy plants; hence, the former should, if possible, be burned, that being the only certain means of preventing the spread of the disease. Damp places, and confined air favour the Fungi; hence, drainage is of value, and the plants liable to injury should be separated, so far as can be done, to permit free circulation of air. Any means to strengthen the plants will probably render them better able to resist the evil influence of the Fungi. Warm, close, showery weather is peculiarly favourable to the spread of the latter, since it promotes the production of conidia, and aids the zoospores in diffusing themselves over neighbouring healthy plants by means of the drops of rain or dew.

In the case of the Potato-disease Fungus (*P. infestans*), numerous remedies have been proposed, *e.g.*, cutting off stems and leaves as soon as disease appears, Jensen's method of earthing-up the drills, &c. *See* **Phytophthora.**

The species of *Peronospora* are distinguished by differences in the erect branches that bear the conidia, and also in the markings of the outer coat of the oospores; but the latter bodies have, as yet, not been detected in some of these Fungi. The genus has been

Peronospora—*continued.*

divided into four sections by Professor de Bary, of Strasbourg, who has employed, as the basis of his arrangement, the modes of development of the zoospores, or mycelium, from the conidia, in forming new plants. This arrangement, however, is not of much assistance in making out the species of such Fungi as may be injuring any cultivated plants; and for ease of reference, therefore, in the following descriptions, the nature of the branching of the erect, fertile stems, and the markings of the outer coat of the resting spores, are chiefly employed.

1. *P. parasitica*, abundant on, and destructive to, many cruciferous plants, including Turnips and Cabbages. On the larger kinds of *Cruciferæ*, the Fungus is often confined to spots on the leaves. It has large, branched haustoria, or suckers, which often nearly fill the cells of the host-plants, from which they draw nourishment. The fertile stems are rather stout below, and five to eight times bifurcated; the branches are rather crowded, and end in slender, short branches, each of which bears on its tip an elliptical, colourless conidium. The conidium shows no papilla, and, in germination, emits a mycelium tube from any point of its surface. The oospore is globular, and has a thin, nearly smooth, outer coat.

2. *P. Viciæ* grows on Peas and Vetches, often doing considerable damage. The fertile stems are rather slender, six to eight times bifurcated, with the branches rather stiff and spreading, and the terminal branchlets rather longer than in most of the other species, and very slender. The conidia are grey, with a pale violet tint, but otherwise much as in *P. parasitica*. The oospore is globular, pale brown, with a network of ridges on the outer coat.

3. *P. effusa* attacks Spinach, and other *Chenopodiaceæ*, causing the leaves to become thickened, and to speedily decay. The fertile stems are rather short and thick, and bifurcate from two to seven times, ending in short, straight or hooked branches. They are grey, with a tinge of violet, as are also the elliptical conidia. The latter germinate as in *P. parasitica*. The oospore is pale brown, with irregular, brown ridges which render it, though globular, decidedly angular in outline. This species forms very dense tufts on the lower surface of the leaves.

4. *P. Schleideniana* grows on Onions and their allies. The fertile threads are rather stout, not, or scarcely, jointed, giving off branches along the sides alternately; branches usually three to five times bifurcated, and ending in short, hooked or spreading branchlets; conidia large, obovoid or nearly pear-shaped, all parts reddish-grey or dull violet. The conidia germinate from any part of their sides. The oospores are globular, brown, smooth, except for an open network of ridges.

5. *P. arborescens* lives on Poppies only, and hence is of no very great practical importance in Britain. It often causes distortions in the plants affected by it. The fertile stems are rather longer and more slender than usual, and are seven to ten times bifurcated; and the branches end in spreading, or hooked and very slender tips. The conidia are nearly round, small, colourless, and germinate from the side. The oospores are globular, brown, marked with a network of ridges.

6. *P. sparsa* is one of the few *Peronosporæ* on woody plants. It grows, as a delicate grey mould, on the under side of the leaves of Roses, in conservatories. The leaves become spotted with brown, and soon shrivel up. The fertile stems of the Fungus bifurcate several times, and end in curved tips, bearing round conidia, which germinate from the side. The oospores of this species have not been observed.

7. *P. nivea* has been already described. The spreading branches, bifurcated from one to three times; the ovoid, rather small conidia, with a papilla at the tip, and producing, not a germinal mycelium tube, but four or five

Peronospora—*continued.*

zoospores; and the smooth, unridged coat of the oospore, distinguish this parasite of the *Umbelliferæ*.

8. *P. ganglioniformis* is parasitic on many *Compositæ*, and among these is the Lettuce, to which it, at times, does much harm. The fertile stems are somewhat flattened and broad, bifurcated three to eight times, and bear at their tips a flattened enlargement, like a nerve ganglion (whence the specific name), on which, chiefly round the margin, stand from two to eight short, slender branchlets. Each of these bears a pale or colourless, nearly round conidium, provided with a minute wart at one end, from which the mycelium tube is emitted in germination. The oospore is yellowish-brown, its outer coat being slightly wrinkled.

9. *P. pygmæa* lives on *Anemone nemorosa* and on *Hepatica triloba*, as well as, occasionally, on cultivated Anemones. It is easily known by the fertile stems being short and stout, and thickened upwards to a kind of head, on which grow from two to six short, slender branchlets. Each of these bears an ovoid or elliptical conidium, which, in germination, gives out all the contents, through a small wart at one end. The oospore is pale brown, and has a smooth, wrinkled coat.

The three following species may possibly occur in Britain, though not yet recorded from this country.

P. viticola is parasitic in North America, on the native American Vines, and on the introduced European Vine. It has not yet crossed the Atlantic, but may easily be brought on the Vines so often imported from America to Europe, since it is abundant in the Eastern United States. It grows on all green parts, and destroys them, rendering them brown. The fertile stems are trifurcated far more often than bifurcated, and end in crowded, short branchlets, bearing elliptical conidia, which form zoospores. The oospore has a smooth, yellow, thick outer coat.

P. Cactorum causes decay and rottenness of the fleshy tissues of cultivated species of *Cactus*. The fertile stems bear a few branchlets, ranged along one side. The conidia are colourless, ovoid or elliptical, with a considerable wart on the tip, and through this the mycelial filament emerges in germination of the conidium. The oospore has a smooth, thick, pale brown outer coat. This disease has been the cause of a good deal of injury in botanic gardens in Germany.

P. Schachtii has frequently proved very destructive to Beets on the Continent. It forms a bluish-grey coat on the lower surface of the leaves, which become yellowish-green, wrinkled, and fleshy, and remain small. Frequently, the young shoots and the heart-leaves are destroyed. The fertile stems bear several short branches; the terminal branchlets are short, straight, blunt, spreading, and bear ovate, dull violet conidia. The oospores are unknown. The mycelium lives through the winter in the diseased plants, and resumes its growth in the young leaves during the following year. The seeds from diseased plants are often affected as shown by the appearance of the Fungus on the seedlings.

The Potato-disease Fungus, frequently described under the name of *Peronospora infestans*, Mont. (*e.g.*, in Cooke's "Handbook of British Fungi"), has, of late years, been placed in a separate genus, under the name *Phytophthora infestans*. For the characters distinctive of the genus, and the habits of and remedies for *P. infestans*, and of the only other species, *P. Fagi*, *see* **Phytophthora.**

PERSEA (a name applied by Theophrastus to an Egyptian tree). Alligator or Avocado Pear. ORD. *Laurineæ*. An extensive genus (about 100 species have been enumerated) of mostly stove trees or shrubs, all of which (except one species from the Canary Islands) are natives of tropical and sub-tropical Asia and America. Flowers disposed in panicles; perianth tube short; limb segments six, almost equal, or the three outer ones smaller; perfect stamens nine. Fruit often

Persea—*continued.*

large and fleshy. Leaves alternate or scattered, coriaceous, penniveined, or more or less distinctly triplinerved. The undermentioned species is the only one introduced, and it is rarely seen in cultivation. It thrives best in a compost of loam and fibry peat. Propagated, in autumn, by layers of the ripened shoots, or, in May, by cuttings of firm shoots, inserted in sand, under a bell glass, in heat.

P. gratissima (most-grateful). Alligator or Avocado Pear. *fl.* green, about ¼in. across. *fr.* pear-shaped, yellow and brown, often tinged with deep purple, and about 4in. long. *l.* elliptical, narrow towards the base, about 6in. long. *h.* 25ft. to 30ft. West Indies, 1739. The flavour of the fruit somewhat resembles that of butter, or marrow, hence it is called "Vegetable Marrow" in the West Indies. It is so rich and mild that most people make use of some spice, or pungent substance, to give it poignancy; and wine, sugar, lime-juice, but mostly pepper and salt, are used. Marks made with the stone of the seed on a white wall will turn as red as blood, and cannot be effaced until the wall is whitewashed, and even then only with difficulty. (B. M. 4580; B. R. 1258.)

FIG. 92. FRUITING BRANCH, LEAF, AND STONE OF PERSICA DAVIDIANA.

PERSICA (so named in allusion to the Peach being supposed to come originally from Persia). Peach. ORD. *Rosaceæ*. A small genus of hardy or half-hardy fruit-trees,

Persica—*continued.*

now included, by Bentham and Hooker, under *Prunus*; they are natives of Europe and the warmer parts of Asia. Flowers almost sessile, solitary or twin, rising from the scaly buds earlier than the leaves. Leaves conduplicate when young. *P. vulgaris*, and its variety below described, are well known and much esteemed fruits. For culture, &c., *see* **Nectarine** and **Peach** respectively.

P. Davidiana (Abbé David's). *fl.* light rose or white. Spring (as soon as, or earlier than, the Almond). *fr.* small, spherical; skin downy, greyish-white, changing to yellow at maturity. *l.* glandular, regularly attenuated towards the base; margins very finely serrated. China. Only of use as an ornamental tree, but its flowering season being so early, the blossoms are frequently destroyed by frosts. See Fig. 92.

P. vulgaris (common).* Peach. *fl.* pale or dark red, sessile. Spring. *fr.* clothed with a velvety tomentum. *l.* lanceolate, glabrous, serrated. *h.* 15ft. Probably Eastern Asia, 1562. SYN. *Prunus Persica.* Of this species, there are several very desirable and ornamental varieties, including some with double flowers, and others with variegated and purple leaves.

P. v. lævis (smooth). Nectarine. *fl.* red. Spring. *fr.* smooth, glabrous. *h.* 15ft. 1562. The Nectarine is distinguished from the Peach by its smooth, and rather firmer, more plump fruit. SYN. *Prunus lævis.*

PERSIMMON. *See* **Diospyros virginiana.**

PERSISTENT. Not falling off, but even remaining on the fruit, or lasting throughout winter, as the leaves of evergreens.

PERSONATÆ. Included under *Scrophularineæ.*

PERSOONIA (named after C. H. Persoon, 1755-1837, a distinguished botanist, author of "Synopsis Plantarum" and other botanical works). SYNS. *Linkia, Pentadactylon.* ORD. *Proteaceæ.* A genus comprising sixty species of greenhouse, ornamental shrubs or small trees; one is a native of New Zealand, and the rest are all Australian. Flowers yellow or white, small or mediocre, solitary in the axils, or, owing to the abortion of the floral leaves, forming short racemes, rarely in slender, terminal, one-sided racemes; perianth regular, the segments recurved in the upper portion. Leaves entire, alternate, or rarely here and there almost whorled. A selection of the species best known to cultivation is given below. They require a compost of equal parts loam, peat, and sand. Cuttings of the ripened shoots will root readily in sand, under a bell glass. The undermentioned species are shrubs, except where otherwise stated.

P. Drummondii (Drummond's). A synonym of *P. longifolia.*

P. ferruginea (rusty).* *fl.* yellow, solitary in the axils, or often densely clustered, terminal or pedunculate in the upper axils; perianth densely ferruginous-pubescent. June. *l.* ovate, oblong-elliptical, or almost lanceolate, acute or obtuse, with a callous point, 2in. to 4in. long. Young branches and shoots slightly ferruginous or hoary-tomentose. *h.* 3ft. 1823. (S. E. B. ii. 83.)

P. Fraseri (Fraser's). A synonym of *P. saccata.*

P. hirsuta (hairy). *fl.* yellow, very shortly pedicellate, solitary within each floral leaf, but crowded into short heads or clusters at or below the ends of the branches. June. *l.* crowded, narrow-linear, acute and rigid, but scarcely pungent-pointed, channelled beneath, with revolute margins, mostly about ½in. long. *h.* 2ft. to 3ft. 1800. Plant pubescent or hirsute, spreading. (L. B C. 327.)

P. lanceolata (lanceolate). *fl.* yellow; pedicels exceedingly short, solitary or two together. June. *l.* lanceolate or oblong-lanceolate, mucronate-acute, much contracted into a short petiole, mostly 1½in. to 2½in. long, flat. Young branches and shoots hoary-pubescent. *h.* 4ft. 1791. (A. B. R. 74; L. B. C. 25.)

P. l. lævis (smooth). *l.* rather longer and thinner than in the type, broad and narrow. Whole plant glabrous. (A. B. R. 280 and L. B. C. 1509, under name of *P. latifolia.*)

P. linearis (linear-leaved). *fl.* yellow, on solitary pedicels. July. *l.* rather crowded, linear, acute or almost obtuse, contracted at the base, 1in. to 2in. long. *h.* 10ft. to 20ft. 1794. A tall shrub or small tree. SYNS. *P. pinifolia, P. pruinosa.* (A. B. R. 77; B. M. 760.)

P. longifolia (long-leaved).* *fl.* yellow, solitary in the axils, but, owing to the abortion of floral leaves, forming often terminal or sub-terminal racemes. July. *l.* linear or linear-lanceolate, 5in. to 8in. long, callous-pointed or obtuse, narrowed into a short

Persoonia—*continued.*

petiole. *h.* 10ft. to 20ft. 1850. A tall shrub or small tree. SYN. *P. Drummondii.*

P. macrostachya (large-spiked). A synonym of *P. saccata.*

P. nutans (nodding). *fl.* yellow; pedicels axillary, solitary or rarely twin, spreading or at length reflexed. July. *l.* narrow-linear, acute, contracted at base, ¾in. to above 1in. long, flat or with the margins slightly recurved. *h.* 1ft. 1824. An erect, but low and bushy shrub. (L. B. C. 922, under name of *P. flexifolia.*)

P. pinifolia (Pine-leaved). A synonym of *P. linearis.*

P. pruinosa (bedewed). A synonym of *P. linearis.*

P. rigida (rigid).* *fl.* yellow, almost sessile and solitary in the axils, but sometimes several crowded at the base of axillary shoots; perianth densely villous. June. *l.* varying from obovate to linear-spathulate, mucronate, much contracted at the base, but scarcely petiolate, ¾in. to 1½in. long, the margins usually recurved or replicate, softly or scabrous-pubescent when young, glabrous when old. *h.* 3ft. to 4ft. 1824. (L. B. C. 1199, under name of *P. spathulata.*)

P. saccata (pouched). *fl.* yellow; pedicels mostly at or below the ends of the branches, and crowded into racemes; upper segment of perianth saccate. July. *l.* linear-terete, sometimes almost filiform, 2in. to 4in. or more long. *h.* 2ft. to 6ft. 1837. SYNS. *P. Fraseri, P. macrostachya.*

P. Toro (Toro). *fl.* yellowish; racemes 1in. long, six to ten-flowered. Summer. *l.* 3in. to 8in. long, very narrow, linear-lanceolate, gradually narrowed into the petiole, acuminate or obtuse and apiculate, quite entire, polished on both surfaces. New Zealand. A small tree.

PERSOONIA (of Michaux). A synonym of **Marshallia** (which *see*).

PERTUSE. Having slits or holes.

PERU BALSAM-TREE. *See* **Myroxylon peruiferum.**

PERU, MARVEL OF. *See* **Mirabilis Jalapa.**

PERUVIAN-BARK-TREE. *See* **Cinchona.**

PERUVIAN MASTIC-TREE. *See* **Schinus Molle.**

PES. The Latin for the foot or stalk; *e.g.*, in compounds, Brevipes, short-stalked; Longipes, long-stalked, &c.

PESCATOREA. Included under **Zygopetalum** (which *see*).

PESOMERIA. Included under **Phaius** (which *see*).

PETAL. The divisions of the corolla, when free—that is to say, not united by their edges to each other—are called Petals.

PETALACTE (from *petalon*, a petal, and *acte*, a ray; referring to the rayed, petal-like scales on the receptacle). SYN. *Petalolepis.* ORD. *Compositæ.* A monotypic genus, the species being a greenhouse, evergreen, hoary-tomentose or woolly sub-shrub. It requires culture similar to **Helichrysum** (which *see*).

P. coronata (crowned). *fl.-heads* white, small, heterogamous, disposed in terminal, crowded cymes or corymbs; achenes glabrous or papillose; involucre campanulate; receptacle small. May. *l.* alternate, entire, obtuse. *h.* 1ft. South Africa, 1816.

PETALIDIUM (from *petalon*, a petal,; in reference to the petal-like bracteoles). SYN. *Pseudobarleria.* ORD. *Acanthaceæ.* A small genus (three species have been described) of unarmed shrubs, inhabiting the East Indies and tropical and Southern Africa. Flowers solitary, in the axils of the upper leaves, shortly pedicellate or sub-sessile. Leaves ovate, entire or dentate. The only species in cultivation is *P. barlerioides*, a pretty stove evergreen. For culture, *see* **Justicia.**

P. barlerioides (Barleria-like). *fl.* white, pedunculate, axillary, solitary, large. June. *l.* ovate, slightly toothed. *h.* 4ft. India, 1840. (B. M. 4053.)

PETALOID. Similar to a petal in colour and texture.

PETALOLEPIS (of Lessing). A synonym of **Petalacte** (which *see*).

PETALOSTEMON (from *petalon*, a petal, and *stemon*, a stamen; referring to the peculiar union of

Petalostemon—*continued.*

these organs in this genus). Prairie Clover. ORD. *Leguminosæ*. A genus comprising about fourteen species of pretty, hardy or half-hardy herbs, usually perennial, gland-dotted, closely allied to *Dalea*; they are confined to the warmer parts of North America. Flowers rose-coloured, purplish-violet, or white; calyx teeth or lobes sub-equal; standard heart-shaped or oblong; heads or spikes terminal, or opposite the leaves, often pedunculate, sub-sessile. Leaves impari-pinnate; leaflets small, entire, exstipellate; stipules minute, setaceous. The best-known species in cultivation are *P. candidus* and *P. violaceus*; these thrive in a compost of sandy loam with a little peat or leaf mould. They may be increased by divisions, in spring. Both are hardy perennials.

P. candidus (white).* *fl.*, corolla white; heads oblong, when old cylindrical. July. *l.*, leaflets seven to nine, lanceolate or linear-oblong. *h.* 1ft. 1811.

P. violaceus (violet).* *fl.*, corolla rose-purple; heads globose-ovate, or oblong-cylindrical when old. July. *l.*, leaflets five, narrow-linear. *h.* 1ft. 1811. (B. M. 1707.)

PETAMENES. A synonym of *Antholyza*.

PETASITES (an old Greek name used by Dioscorides, from *petasos*, an umbrella; alluding to the size of the foliage). Including *Nardosmia*. ORD. *Compositæ*. A genus comprising about a dozen species of hardy, more or less white-tomentose or woolly herbs, with perennial rhizomes or stems, natives of Europe, Asia, and North America. Flower-heads purple or white, rarely yellowish-white, heterogamous, mediocre, racemose or thyrsoid-paniculate at the tips of the scapes; involucre campanulate or cylindrical; receptacle flat, naked. Leaves radical, often ample, cordate or reniform. Scapes or stems many-headed, with the leaves reduced to alternate scales, or rarely with the lower ones more evolute. Many of the species formerly included under *Tussilago* are now referred, by Bentham and Hooker, to this genus. All succeed in any ordinary soil, and may be increased by divisions. Some of the species are rather pretty. The following are among the best-known.

P. alpina (alpine). A synonym of *Homogyne alpina*.

P. fragrans (fragrant).* *fl.-heads* white, sweet-smelling; involucral scales acute. February. *l.* cordate at base, orbiculate-cartilaginously toothed; lobes sub-rotund at base. *h.* 6in. South-western Europe, 1806 (naturalised here and there in Britain). (G. C. n. s., ix. 147.) SYN. *Tussilago fragrans* (B. M. 1388).

P. frigida (frigid).* *fl.-heads* white. April and May. *l.* rounded, somewhat reniform, white-woolly beneath, palmately and deeply five to seven-lobed, 6in. to 10in. broad; lobes toothed and cut. *h.* 6in. Arctic regions, 1778. SYN. *Tussilago frigida*.

P. niveus (snowy). *fl.-heads* white, borne on simple pedicels. March. *l.* broadly cordate, sub-triangular, toothed, slightly glabrous above, snowy-tomentose beneath; lobes divaricate, sub-acute. *h.* 1ft. Europe, 1713.

P. vulgaris (common). Bog Rhubarb; Butter Bur. *fl.-heads* borne in cylindric panicles, 3in. to 10in. long, the female longest, elongating after flowering; pedicels slender. March to May. *l.* 3in. to 3ft. in diameter, reniform or orbicularly cordate, irregularly toothed, white or cobwebby beneath, and, when young, above also. Stems 4in. to 18in. high, stout, purplish below. Europe (Britain), &c. SYNS. *Tussilago hybrida* (this name represents the female plant) and *T. Petasites*. (Sy. En. B. 783, 784.)

PETASOSTYLIS. Included under **Leianthus** (which *see*).

PETIOLAR. Borne on, or relating to, a petiole.

PETIOLE. The footstalk of a leaf.

PETIOLULE. The footstalk of a leaflet.

PETIVERIA (named after James Petiver, F.R.S., 1665-1718, an apothecary and distinguished botanist, of London). SYN. *Mapa*. ORD. *Phytolaccaceæ*. A monotypic genus (according to the authors of the "Genera Plantarum"). The species is an ornamental, slender, erect, glabrous or puberulous, dichotomously-branched stove herb, shrubby at base, with an alliaceous

Petiveria—*continued.*

smell. It thrives in a mixture of loam and peat, and may be increased by cuttings of the half-ripened wood, rooted in bottom heat.

P. alliacea (Onion-like). Guinea-hen Weed. *fl.* white, very shortly pedicellate, small, disposed in axillary and terminal racemes; perianth conical at base, with four spreading, persistent segments. June. *fr.* erect. *l.* alternate, petiolate, ovate, entire, membranous, 3in. to 4in. long (including the short petiole), 1½in. broad, attenuated at both ends, pellucid-dotted. Stem 2ft. to 3ft. high. Mexico to Brazil. (L. B. C. 148.)

P. a. octandra (eight-anthered). *fl.* with eight anthers and purplish filaments. *l.* smaller, and stem shorter, than in the type. SYN. *P. octandra*.

P. octandra (eight-anthered). A synonym of *P. alliacea octandra*.

PETRÆA (Linnæus dedicated this genus to Robert James, Lord Petre, a famous patron of botany, who died in 1742). ORD. *Verbenaceæ*. A genus comprising about a dozen species of beautiful, twining or arborescent, stove shrubs, natives of tropical America. Flowers violet, purple, or bluish, shortly pedicellate in the axils of the bracts; calyx lobes five, large, prettily coloured at the flowering season; corolla often intensely coloured, with a short tube, and an oblique, five-fid limb; racemes elongated, terminal or in the upper axils. Leaves opposite, coriaceous. The species described below, which are, probably, all in cultivation, should be planted in good, rich mould, and kept in a strong heat. Propagation may be readily effected by cuttings, inserted in light sandy soil, under a glass. *P. volubilis* is an extremely handsome twiner.

P. arborea (tree-like).* *fl.* blue, saturated with violet, disposed in copious, axillary or solitary, loose, pendulous racemes, 6in. long. June. *l.* oblong-lanceolate, obovate-oblong, or elliptic, narrowed at base, 4in. to 7in. long, 1½in. to 2½in. broad, sub-cordate, very shortly petioled, obtuse or retuse, and mucronate at apex, entire. *h.* 12ft. South America, 1823. Arboreous. (L. B. C. 1606, under name of *P. erecta*.)

P. macrostachya (large-spiked). *fl.* lilac, disposed in terminal, elongated, pendulous racemes, which are 1½ft. to 2ft. long; pedicels shorter than the calyx tube. June. *l.* petioled, lanceolate, oblong, or oval-elliptic, 4in. long, 2½in. broad, shortly acuminate at both ends, mucronate, entire, undulated. *h.* 20ft. South America. Twiner. (P. M. B. iv. 99, under name of *P. Stapeliæ*.)

P. rugosa (wrinkled). *fl.* blue, shortly pedicellate, disposed in axillary or terminal, solitary, erect, loose racemes. July. *l.* rigid, very shortly petioled, elliptic, sub-cordate at base, and slightly rounded or retuse at apex, mucronate, entire, 2in. to 2½in. long, 1½in. to 1½in. broad, with reflexed margins, reticulately wrinkled above. *h.* 6ft. to 8ft. Caraccas, 1824. Arboreous.

P. volubilis (twining).* Purple Wreath. *fl.* purple, on pedicels twice as long as the calyx tube, and disposed in a single, terminal, elongated, nodding raceme, about 6in. long. July. *l.* 3in. to 4in. long, very shortly petioled, ovate, elliptic, or oblong, rounded or slightly narrowed and loosely cordate at base, acuminate or obtuse, mucronate, entire, undulated. *h.* 20ft. Panama, &c., to Brazil, 1733. (B. M. 628.)

PETRÆUS, PETROSUS. Growing in rocky or stony places.

PETROBIUM (from *petros*, a rock, and *bio*, to live; alluding to the habitation of the species). SYN. *Laxmannia* (of Forster). ORD. *Compositæ*. A monotypic genus, the species being an ornamental, stove tree. It thrives in sandy loam, and may be increased by cuttings, which root readily in a similar soil.

P. arboreum (tree-like). *fl.-heads* yellow, dicecious, mediocre or rather small, disposed in corymbose, leafy panicles, at the apices of the branches; involucre campanulate; bracts few; receptacle small, flat; achenes hispidulous, scabrous. June. *l.* opposite, dentate. St. Helena, 1816.

PETROCALLIS. Included under **Draba** (which *see*).

PETROCARYA. A synonym of **Parinarium** (which *see*).

PETROCOPTIS. Included under **Lychnis** (which *see*).

PETROMARULA. Included under **Phyteuma** (which *see*).

PETROPHILA (from *petros*, a rock or stone, and *phileo*, to love; in allusion to the place of growth). ORD. *Proteaceæ*. A genus comprising thirty-five species of Australian, greenhouse shrubs. Flowers usually white or yellow, in dense, terminal or rarely axillary spikes or cones; perianth tube slender, separating into four segments from the base, or remaining united, the limb of four linear laminæ. Fruit a small, sometimes winged nut. Leaves scattered, rigid, entire or divided, frequently terete or narrow. It is doubtful if even the few species here described are still in cultivation. For culture, *see* **Banksia.**

P. acicularis (needle-shaped).* *fl.* white, red; cones terminal and sessile, nearly globular, about ¾in. in diameter. May. *l.* undivided, usually slender, terete, and more or less distinctly grooved on the upper side, obtuse, or with a short, straight, curved point. *h.* 2ft. 1830. (B. M. 3469.)

P. glanduligera (gland-bearing). A synonym of *P. Serruriæ*.

P. heterophylla (variable-leaved). *fl.* white; cones all axillary, sessile, ovoid-oblong, the old ones ¾in. long. June. *l.* linear or linear-lanceolate, 2in. to 4in. long, more or less flattened, entire and acute or dilated towards the end, and then often truncate or notched, with a small point in the notch, or deeply divided into two or three lobes. *h.* 4ft. 1840.

P. pulchella (pretty). *fl.* white; cones terminal, sessile, solitary or with one or two axillary ones close below, oblong or cylindrical, 1in. to 1½in. long. July. *l.* 1½in. to 2½in. long, twice or thrice pinnate; segments numerous, not spreading, terete, grooved above, rather slender, not pungent. *h.* 6ft. to 8ft. 1840. (B. M. 796, under name of *Protea pulchella*.)

P. rigida (rigid). *fl.* white; perianth nearly ¾in. long; cones terminal or in the forks of the branches, sessile, nearly globular. May. *l.* very rigid, trichotomously bipinnate; ultimate segments sometimes ¼in. to 1in. long, all terete, divaricate, and pungent-pointed. *h.* 2ft. to 3ft. 1823. A rigid shrub.

P. Serruriæ (Serruria-like). *fl.* white; perianth tipped with small, stipitate glands; cones ovoid or at length conical, sessile or shortly pedunculate in the upper axils, often crowded in terminal clusters. May. *l.* rarely above 1in. long and broad, crowded, twice or thrice-pinnate, with the lower segments close to the base; segments numerous, slender, terete, grooved above. *h.* 3ft. to 4ft. 1840. SYN. *P. glanduligera*.

PETROPHYES. A synonym of **Monanthes** (which *see*).

PETTERIA (named in honour of Franz Petter, who wrote an account of a botanical tour in Dalmatia in 1832). ORD. *Leguminosæ*. A monotypic genus. The species is a hardy, erect shrub, requiring culture similar to **Cytisus** (which *see*).

P. ramentacea (ramentaceous). *fl.* disposed in dense, terminal, pedunculate, pyramidal, erect racemes; calyx campanulate, three-lobed, the lobes tomentose-ciliate, obtuse; corolla glabrous; keel silky-villous; pedicels hoary. Spring. *l.* ternate, petiolate; leaflets elliptic, entire, cuneate at base, obtuse or retuse at apex, glabrous. Dalmatia, 1838. (B. R. 1843, 40, under name of *Cytisus Weldenii*.)

PETTIGREE, or PETTIGRUE. *See* **Ruscus aculeatus.**

PETTYWHIN. A common name for *Genista anglica* and *Ononis arvensis*.

PETUNGA (*Peetunga* is the Bengalese name of *P. Roxburghii*). SYNS. *Higginsia* (of Blume), *Spicillaria*. ORD. *Rubiaceæ*. A genus consisting of four or five species of glabrous, stove shrubs, with terete, twiggy branchlets, natives of Eastern Bengal, the Malay Peninsula, and the islands of the Indian Archipelago. Flowers white, small, disposed in short, axillary, simple or somewhat compound spikes, sessile or shortly pedicellate, bibracteolate; calyx persistent, tube ovoid, limb four-toothed; corolla funnel-shaped, with a short tube, a very villous throat, and four spreading, oblong lobes. Leaves opposite, petiolate, oblong or lanceolate, narrowed to both ends. *P. Roxburghii* is an ornamental shrub, requiring culture similar to that recommended for **Catesbæa** (which *see*).

P. Roxburghii (Roxburgh's). *fl.* small; spikes about one-half or one-third shorter than the leaves; bracts and calyx glabrous. May. *l.* elliptic-oblong, glabrous, drooping, 3in. to 4in. long, and about 1in. broad; stipules large, caducous. *h.* 3ft. to 8ft. India, 1820.

PETUNIA (from *petun*, the Brazilian name of tobacco; alluding to the affinity of this genus with *Nicotiana*). ORD. *Solanaceæ*. A genus comprising about a dozen species of highly ornamental, hardy or half-hardy, annual or perennial herbs, often viscid-pubescent, branched; they inhabit Brazil and the Argentine Republic, one being broadly dispersed from Western South America to Brazil. Flowers violet or white, sometimes showy, sometimes small, on solitary pedicels; calyx deeply five-fid or nearly five-parted; corolla funnel or salver-shaped, the tube cylindrical, or swollen above; limb plicate, equal or oblique-spreading, the lobes short, broad, and loosely bilabiate and imbricating at the apex; stamens five, affixed below or at the middle of the tube. Leaves entire, usually small.

Petunias are very showy and popular plants, effective when grown in pots, and also in summer flower beds outside. *P. nyctaginiflora* and *P. violacea* are species from which the numerous garden varieties are supposed to have been obtained; as they were not introduced until early in the present century, the cultivation of the plant under notice does not extend any further back. For a long period, considerable attention was paid by florists to the improvement of Petunias, and excellent results were obtained. Less has been done of late years in selecting and naming varieties; still, the plant is far from being allowed to fall into neglect. In some parts, particularly in the West of England, it is most successfully cultivated for exhibition.

Petunias may be raised in any quantity from seeds, and named kinds readily propagated from cuttings. Seeds, which are very minute, should be sown, during March, in pans of light, finely-sifted soil, very slightly covered, and placed in a gentle warmth. They usually vegetate in a very short time, and, before the seedlings become crowded, they should be carefully pricked off in other pans or pots. Afterwards, when large enough, pot them off singly, pinch out the points before they get very high, to induce a compact habit, and keep growing on in an intermediate house, or a low pit. Early in May, those intended for planting out should be gradually inured to the open air, and others, retained for flowering inside, should receive the final potting, and be kept in frames where plenty of air can be admitted. The plants flower profusely at the latter part of summer and in autumn, when they prove very useful and effective for greenhouse decoration. Plants for providing cuttings in spring should be preserved through the winter in a warm greenhouse. They may be obtained by striking some cuttings, in autumn, for the purpose. Young shoots root readily in a close frame, during February and March, and plants thus obtained may be grown on with little trouble. Petunias succeed best in a compost of about two parts loam to one of manure. They require plenty of water all through the summer. Slender stakes are necessary, to keep the plants from falling about.

The three species known in gardens are described below.

P. acuminata (taper-pointed). A synonym of *Nicotiana acuminata*.

P. intermedia (intermediate). *fl.* axillary or opposite the leaves; corolla ¾in. long and broad, pubescent-glandular without; tube yellow-striated, longer than the calyx; limb large, purple, with a paler margin; peduncles ¼in. to 1in. long, filiform. August. *l.* linear-oblong, sub-spathulate, obtuse, attenuated at base, entire, sessile, 1in. to 1½in. long. Stem erect, branched, leafy. *h.* 1ft. Buenos Ayres, 1832. Half-hardy perennial, at length becoming sub-shrubby. (B. R. 1931.) SYNS. *Nierembergia intermedia* (P. M. B. ii. 219; S. B. F. G. ser. ii. 237), *Salpiglossis linearis* (B. M. 3256).

P. nyctaginiflora (Nyctaginia-flowered). *fl.* on axillary, solitary, one-flowered peduncles, far exceeding the leaves; corolla white, large, the tube cylindrical, three or four times as long as the calyx; limb very spreading. August. *l.*, cauline ones solitary, ovate, oblong, slightly obtuse, nearly or quite sessile; floral ones sessile, cordate-ovate, twin, nearly opposite. *h.* 2ft. South America, 1823. A diffuse, villous-glandular, half-hardy annual. See Fig. 93. (B. M. 2552; P. M. B. ii. 173; S. B. F. G. 119.)

Petunia—*continued.*

P. violacea (violet). *A.* on pedicels 2in. long; corolla purplish-violet, very elegant, 1in. or more long, infundibuliform-campanulate, with a ventricose tube and a sub-equal limb. August. *l.* **ovate**, shortly petiolate, ovate-lanceolate, acute; floral ones

FIG. 93. FLOWERING BRANCH OF PETUNIA NYCTAGINIFLORA.

twin. Stems numerous, 6in. to 10in. long, prostrate, erect and slightly branched at apex. Buenos Ayres, 1851. Half-hardy perennial. See Fig. 94. (B. M. 3555; B. R. 1628; P. M. B. i. 7.) SYNS. *Nierembergia phœnicea* (S. B. F. G. ser. ii. 185), *Salpiglossis integrifolia* (B. M. 3115).

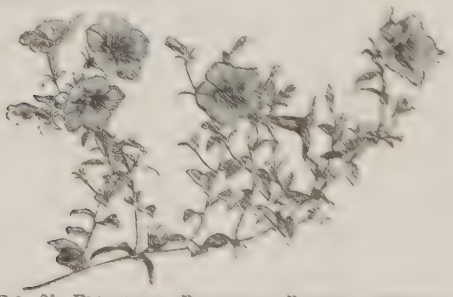


FIG. 94. FLOWERING BRANCH OF PETUNIA VIOLACEA.

Varieties. Named varieties of Petunias are not met with nearly so often of late years as formerly, the more

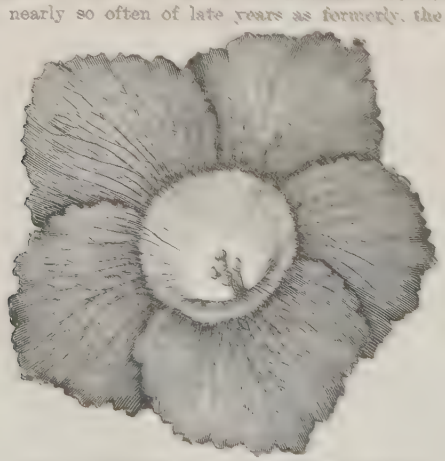


FIG. 95. FLOWER OF SINGLE GARDEN PETUNIA.

general system of culture now being that of growing plants from seed annually. In the single varieties, re-

Petunia *continued.*

presented in Fig. 95, there is a great diversity of colouring; some are selfs, others are beautifully veined, striped, or marked in various ways. Only single varieties were grown at first; afterwards, semi-double forms began to appear; and now the latter are numerous, very full,

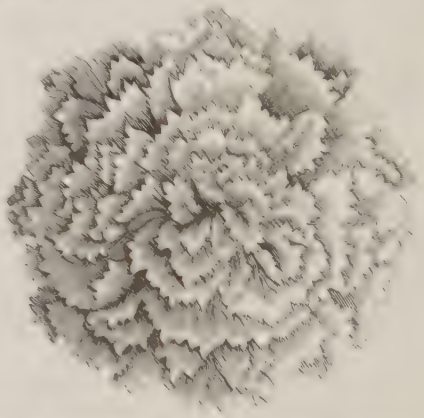


FIG. 96. FLOWER OF DOUBLE GARDEN PETUNIA.

and also beautifully fimbriated, as shown in Fig. 96. A selection of named varieties is subjoined. Those with double flowers do not succeed well outside; they should be grown in pots, under glass.

Double Varieties. ADONIS, white, suffused and blotched purple, fringed. AIDA, deep rose-purple, blotched white; large. ANICK, rosy-purple, splashed and suffused white, beautifully fringed. BAYARD, maroon-purple, self. BEAUTY OF MANNAMEAD, white, blotched and tipped claret-purple. BEAUTY OF RANNAMEAD, rich purple-plum, tipped and blotched white. CONVOLVE, pearly-white, blotched light purple; large, beautifully fimbriated; distinct and fine. DE CANDOLLE, deep crimson-purple, edged and blotched white; free. HUMERNIA, rosy-purple, edged green; peculiar. LABYRINTH, white, edged and tipped with rosy-purple, full, and fringed. MADAME HENGIST, purple, edged white. M. A. LOHIER, pure white blotched deep magenta, beautifully fimbriated; fine. MINNIE EVANS, rosy-purple, mottled and flaked white. MRS. WEBB, deep lilac-mauve, beautifully veined with crimson-purple, fringed; very large. OPHELIA, pure white, marked with deep purplish-crimson; large and fine. PERFECTION, deep rose; very double and effective. POSTHUMIA, white, beautifully blotched rosy-purple; fine. ROMULUS, rose, suffused white, veined crimson; large.

Single Varieties. AVALANCHE, white, tipped and tinged rose; medium size, distinct. BEAUTY, white, edged and barred purple; large. BOULE DE NEIGE, satiny-white, throat slightly tinted lavender; free and effective. CANNELL'S FAVOURITE, rosy-red, suffused purple; very large, of good [illegible]. CHARMER, crimson, suffused purple, edged and striped white; large and fine. CLAIRVOYANT, white, distinctly edged and barred crimson and maroon; large. DELICATA, white, barred purple. DR. DANIEL, crimson-maroon, white throat; free, and of good habit. DR. HOGG, deep magenta, white throat, heavily veined purple; large. DR. TUCKER, rosy-purple, large throat, veined and netted. ETRUSANS, white, suffused and barred purple-crimson, fimbriated. LITTLE PET, soft pink, veined maroon; pretty and distinct. MISS MINNEY, deep lilac, edged white, veined purple. MRS. A. MAYES, white, marked with bars of purple from centre; good habit. MRS. S. HIBBERD, white, striped from centre with maroon; fine. MRS. W. ELDER, white, edged with bright purple, fine shape. PURPLE KING, deep plum-purple, black throat; very rich and distinct colour. SCIPPIRE, intense bright purple, shaded crimson; a good bedder.

PEUCEDANUM (the old Greek name used by Hippocrates). Including *Pastinaca*. ORD. *Umbelliferæ*. A genus comprising about 100 species of perennial, very rarely annual, herbs, shrubs, or rarely trees, dispersed over the Northern hemisphere, the Andes of tropical America, and tropical and Southern Africa. Flowers white or yellow, rarely pink, often polygamous, in compound, frequently many-rayed umbels. Leaves pinnately or ternately decompound, rarely simply pinnate. The species are of little horticultural value. The following

Peucedanum—*continued.*

are British plants: *P. officinale* (Sulphurwort), *P. Ostruthium* (Masterwort), *P. palustre* (Milk Parsley), and *P. sativum* (Wild Parsnip). For culture of the last-named, *see* **Parsnip.**

P. sativum (cultivated). Parsnip. *fl.* bright yellow, small; umbel-rays many, stout, long. July and August. *l.* shiny, pinnate; leaflets two to five pairs, 1in. to 3in. long, sessile, ovate, inciso-serrate. Stem 2ft. to 3ft. high, stout, angled, furrowed, fistular. Europe (Britain), Siberia. Annual or biennial. The Parsnip has been cultivated since the time of the Romans. SYN. *Pastinaca sativa.*

PEUMUS (said to be the native name in Chili). SYNS. *Boldea, Ruizia.* ORD. *Monimiaceæ.* A monotypic genus. The species is a small, greenhouse, evergreen, fragrant tree. It succeeds in a compost of sandy peat, and may be increased by cuttings.

P. Boldus (Boldus). *fl.* white, diœcious, disposed in terminal cymes, which are shorter, or scarcely longer, than the leaves; male perianth larger than the female, of ten or twelve lobes, two or three-seriate, imbricated. May. *l.* opposite, or rarely alternate, coriaceous, ovate-elliptic, acute, entire. *h.* 20ft. Chili, 1844. (B. R. 1845, 57, under name of *Boldoa fragrans.*) The leaves are used in medicine for the purpose of assisting digestion, &c. The fruit is sweet, and is eaten in Chili, and the bark is used for tanning.

PEYROUSIA, of Sweet. A synonym of **Lapeyrousia** (which *see*).

PEZIZA. A large genus of Fungi, of which by far the greater number live on decaying remains of animals or of plants, or on dung or earth in which there is abundance of decaying organic matter. A few grow upon and injure living plants, both wild and cultivated. The vegetative system of the Fungus consists of mycelium hidden in the substance on which it grows. The conspicuous part, by means of which the species are identified by mycologists, is that specialised for reproduction.

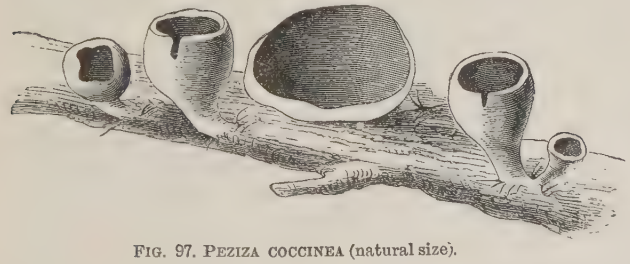


FIG. 97. PEZIZA COCCINEA (natural size).

This is in the form of a cup, rather shallow in some, deep in others (see Figs. 97, 98, and 99). This large genus has been broken up into sections, treated by some mycologists as genera, characterised by consistence, presence or absence of a stalk, of hairs externally, of a membrane closing the young cups, &c.; but the assemblage of species, as a whole, is a very natural one. They vary in size of cups from several inches across to a size too small to be seen without a lens. The inner surface of the cup is lined with a layer of large cells, of cylindrical or club-shaped form (asci), standing erect (see Fig. 98, *d*), in each of which lie eight small, oval, smooth, or, less often, warty cells (spores), which are set free by the asci bursting at the end next the surface. Sometimes the spores are emitted in a thin cloud, when the Fungus is exposed to dry air.

While many of the species produce the cups on a mycelium of loosely-woven hyphæ, or filaments, formed in the substance from which the Fungus is drawing its nourishment, other species form a sclerotium, *i.e.*, a mass composed of densely interwoven hyphæ grown together, so as to resemble a true tissue (see Fig. 99, *sc*). This body is usually black and hard outside, but pale and soft inside. It is fitted to resist changes of temperature during winter; and in spring it aids in reproduction by

Peziza—*continued.*

producing one or more cups, of the structure described above. A very common and well-known example is the sclerotium, so common in winter on dead herbaceous stems, called *S. durum.* In spring, there is a grey mould, formed largely on it (*Polyactis cinerea*), which produces myriads of round conidia or spores. Later on, long-stalked cups of a *Peziza* (*P. Fuckeliana*) grow out from the same sclerotium.

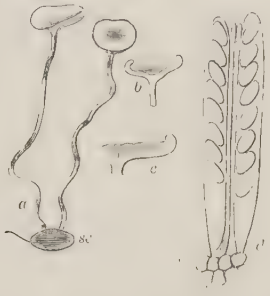


FIG. 98. PEZIZA POSTUMA—*a*, Small Specimen (natural size), with two Cups on slender stalks, which rise from an oval Sclerotium (*sc*); *b*, Cup, cut lengthwise; *c*, Section of Half of Cup, showing surface-layer of Asci; *d*, Two Asci, each with eight Spores, arising from small-celled Tissue of Cup (magnified about 250 times).

These remarks must be restricted to the species of *Peziza* that give rise to disease in cultivated plants, and therefore the other kinds will not be again referred to. The most hurtful recorded in Britain is one that has proved destructive to Potatoes in Ireland and in Scotland; and it has also been injurious in Norway. The plants become covered with a thick felt of mycelium all over the diseased parts; and amidst this are formed masses of compact tissue (sclerotia), at first pale, then becoming dark. Some of these masses are as large as a small bean, but few exceed a small pea in size. In a short time, the host-plant perishes, but the Fungus goes on to perfect its sclerotia. From each of these, in the summer, there grow two or three cups. When fully grown, these are nearly flat, and about ⅛in. or ¼in. across, and they are supported on a slender, wavy stalk, from 2in. to 4in. long. Messrs. Berkeley and A. S. Wilson have named it *P. postuma*, but it seems very closely allied to *P. sclerotiorum*, Lib., and *P. ciboroides*, Fr. (see Fig. 99); and it is doubtful whether they are really

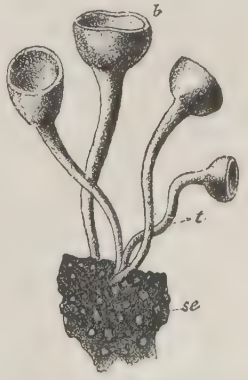


FIG. 99. PEZIZA CIBOROIDES (enlarged)—*b*, Cups; *c*, Stalks; *sc*, Portion of Tissue of Sclerotium.

distinct species. *P. sclerotiorum* causes disease in Turnips and Cabbages in Germany, forming sclerotia

Peziza—*continued.*

in the stems between the surface-layer and the wood. The infested plants ought to be burned, to prevent the spread of the disease, and this should be done early in the season, before the sclerotia have fallen to the soil. The structure of *P. postuma* is shown in Fig. 98.

Another *Peziza* of some importance is *P. Willkommii*, which grows on resinous swellings upon the branches of Larch. The cups are sessile, or shortly stalked, hairy, and pale outside, orange inside, and are about ⅛in. in breadth. This Fungus is sometimes referred to *P. calycina* as a variety. The diseased branches gradually wither and, in time, the tree is destroyed. Some writers believe that the Fungus does not originate disease, but only settles on punctures made by Aphides. In any case, the dying branches should be burned, to prevent the spread of the disease to other trees.

PFAFFIA (named in honour of C. H. Pfaff, 1774-1852, Professor of Chemistry at Kiel). ORD. *Amaranthaceæ*. A genus comprising about fifteen species of slender, erect, stove herbs, natives of Brazil. Flowers in dense spikes or heads; perianth five-parted, with sub-equal segments. Leaves opposite, sessile or nearly so, entire. For culture of *P. gnaphaloides*, the only species introduced, *see* **Celosia.**

P. gnaphaloides (Gnaphalium-like). *fl.* white, disposed in solitary heads, on slender peduncles, 7in. to 15in. long. June. *l.* ten to fifteen lines long, two to four lines broad, almost erect, soft; lower ones oblong or oblong-ovate, obtuse, slightly mucronulate; upper ones narrow-linear. *h.* 1ft. 1822. Perennial.

PFEIFFERA. Included under **Rhipsalis** (which *see*.)

PFEIFFERIA. A synonym of *Cuscuta.*

PHACA (from *Phake*, an old Greek name applied by Theophrastus to a leguminous plant). Bastard Vetch. ORD. *Leguminosæ*. A genus of hardy, herbaceous perennials, now included, by Bentham and Hooker, under **Astragalus** (which *see* for characters and culture).

P. alpina (alpine). *fl.* yellow. July. Pods compressed, half-ovate, acute, smoothish. *l.* with nine to twelve pairs of oblong, obtuse, pubescent leaflets. *h.* 1ft. Alps, &c., 1759. (F. D. 856.) The variety *dahurica* is firmer and more erect, with a harder pod.

P. bætica (Bætic). *fl.* white, the size and shape of those of *Sutherlandia*. September. Pods oblong, boat-shaped, compressed. *l.* with seven to ten pairs of ovate, mucronate leaflets, which are villous beneath. *h.* 1ft. to 2ft. South Europe, &c., 1640. (S. F. G. 727.)

P. frigida (cold). *fl.* cream-coloured. July. Pods stipitate, oblong, inflated, rather hairy. *l.* with four to six pairs of ovate-oblong, rather ciliated leaflets. Stems erect, glabrous, almost undivided. *h.* 1ft. North Europe, &c., 1795. (J. F. A. 166.)

PHACELIA (from *phakelos*, a fascicle; in allusion to the disposition of the flowers). SYNS. *Aldea*, *Eutoca*, *Microgenetes*, *Whitlavia*. ORD. *Hydrophyllaceæ*. A genus comprising fifty species of mostly hardy, annual or perennial herbs, usually scabrous-pubescent or hispid, sometimes erect, tall, and simple or branched, occasionally dwarf, diffuse, and much-branched or tufted; they are mostly natives of Western North America, Mexico, and the Chilian Andes. Flowers blue, violet, or white, disposed in terminal cymes, which are usually pedunculate or reduced to a simple raceme; calyx lobes linear, lanceolate, or oblong; corolla campanulate or sub-rotate, rarely tubular or funnel-shaped; stamens five, exserted or included. Leaves pinnately lobed or dissected, rarely undivided, deeply toothed, or entire. The species thrive in any ordinary garden soil. The perennials may be increased by divisions, and the annuals by seeds. The best-known species, some of which are rather ornamental, are described below; they are annuals, except where otherwise stated.

P. campanularia (bell-flowered).* *fl.* deep blue, with a white spot at the base of each sinus, large, broadly campanulate. *l.* stalked, roundish-oblong, crenate. *h.* 6in. to 8in. California, 1882. Plant much-branched. (B. M. 6735; G. C. n. s., xx. 135.)

Phacelia—*continued.*

P. congesta (crowded). *fl.*, corolla blue, campanulate, almost twice as long as the calyx; racemes corymbose, rather loose, almost equalling the leaves. June. *l.* 1in. to 2in. long, pinnatisect; segments one to four on both sides, unequal, the terminal one larger, and three-lobed. Stem 8in. to 15in. high, erect, flexuous. Texas, 1835. (B. M. 3452.)

P. divaricata (spreading). *fl.* light violet, sub-sessile; corolla rotate-campanulate; racemes many-flowered, elongated, unilateral, longer than the leaves, sometimes axillary, sometimes opposite the leaves. May. *l.* alternate, petiolate, ovate or oblong, entire, slightly obtuse, 1in. to 3in. long. Stems dichotomously divaricating, fragile, decumbent. California, 1833. (B. M. 3706 and B. R. 1784, under name of *Eutoca divaricata*.)

P. d. Wrangeliana (Wrangel's). A variety with sometimes three-lobed, radical leaves. (S. B. F. G. ser. ii. 362, under name of *Eutoca Wrangeliana*.)

P. Franklinii (Franklin's). *fl.* blue, sub-sessile; corolla spreading-campanulate; racemes spike-formed, short. May. *l.* 1in. to 3in. long; radical ones clustered, cauline ones alternate, all lanceolate, pinnate-parted; lobes seven to ten, oblong, entire or irregularly two to five-lobed. Stem 6in. to 10in. high. Shores of Lake Superior, &c., 1827. (B. M. 2985, under name of *Eutoca Franklinii*.)

P. grandiflora (large-flowered). *fl.* light violet-purple, sub-sessile; corolla 1in. to 1½in. in diameter; racemes circinate at apex. Early summer. *l.* broadly ovate, 1½in. long, dentate, sub-cordate at base, wrinkled, and, as well as the stem and calyx, hispid. *h.* 5ft. California. (B. M. 5029, under name of *Cosmanthus grandiflorus*.)

P. Menziesii (Menzies'). *fl.* purple, sub-sessile; corolla ½in. to ¾in. in diameter, spreading-campanulate, twice as long as the calyx. June. *l.* hispid, linear, entire, trifid, or pinnatifid, with few, unequal, oblong or linear lobes. Stem erect. *h.* 1ft. North-west America, 1826. (B. M. 3762 and S. B. F. G. ser. ii. 334, under name of *Eutoca Menziesii*; B. R. 1180, under name of *E. multiflora*.)

P. Parryi (Dr. Parry's). *fl.* dark violet-blue; corolla 1in. in diameter, almost rotate; tube very short; limb expanded, with rounded lobes; cymes many-flowered, exceeding the leaves. Summer. *l.* stalked, ovate or ovate-oblong, hairy on both surfaces; petiole 2in. to 4in. long. *h.* 6in. to 12in. Southern California. A viscid annual. (B. M. 6842.)

P. sericea (silky). *fl.* bluish-purple; corolla sub-campanulate, as long as the calyx; racemes spike-formed, compound, terminal, much longer than the leaves, dense-flowered. June. *l.*, lower ones approximating pinnatifid, silky on both sides, the lower lobes lanceolate, extrorse incised; upper leaves entire, linear. Stem 10in. high. Rocky Mountains, 1827. Perennial. (B. M. 3003, under name of *Eutoca sericea*.)

P. tanacetifolia (Tansy-leaved). *fl.* bluish-pink; corolla rather longer than the calyx, campanulate; racemes spike-formed, elongated, dense-flowered, corymbose. June. *l.* pinnatisect, 2in. to 6in. long; segments three to seven each side, with a terminal one, oblong, unequally cut-toothed, the lobes or teeth ovate, acute. Stem sub-erect. *h.* 2ft. California, 1832. This species is frequently grown as a bee plant. (B. M. 3703; B. R. 1696; S. B. F. G. ser. ii. 360.)

FIG. 100. PHACELIA VISCIDA, showing Habit and detached Flowering Branchlet.

P. viscida (viscid).* *fl.* blue, purplish; corolla about ⅜in. broad; racemes opposite the leaves, erect, many-flowered, 4in. to 8in. long. July. *l.* broadly ovate, 1½in. to 3in. long, shortly petiolate, sub-cordate, angulate, serrate; upper ones deeply or simply

Phacelia—*continued.*

toothed. Stem erect, 1ft. high, branched. California, 1834. Plant glandular, pilose, viscous. See Fig. 100. (B. M. 3572, under name of *Eutoca viscosa*; B. R. 1808 and S. B. F. G. ser. ii. 368, under name of *E. viscida*.)

P. Whitlavia (Whitlavia).* *fl.* large, in terminal, many-flowered racemes; calyx deeply cut to the base; corolla rich blue, with an ample tube and a nearly equal limb of five spreading lobes. June. *l.* alternate, nearly deltoid or ovate-deltoid, coarsely and doubly serrated, hairy-pubescent; petioles generally longer than the leaves. *h.* 2ft. California, 1854. (B. M. 4813.)

PHAEDON BETULÆ (Mustard Beetle). This beetle is about ⅛in. long, oval, of a glossy violet or brilliant blue, sometimes greenish; the head and thorax are minutely punctate; wing-cases punctate-striate; lower surfaces of body, legs, and antennæ black. The eggs are laid on the backs of the leaves. The larvæ are flattened. The body is broadest about the fifth segment, and tapers slightly to each end. It is of a smoky-yellow colour, spotted with black; the head is black. Each segment is prolonged at the sides into a conical protuberance. There are a few scattered hairs on the body. The insects are believed to pupate in the soil. There are two broods in the year, and the beetles that emerge in autumn hybernate. In "Farm Insects," p. 104, Mr. Curtis attributes to this species damage done to Turnips; and, in 1881, Mr. Fryer drew attention to it as destructive to Mustard and Cabbages. In Ormerod's "Report" for 1882, pp. 74-76, there is an account of the ravages of these insects in the Fen District of England, especially around Whittlesea, where the beetles prove so destructive to cultivated Mustards, Cress, Rape, and Cole, "that, in six or seven days, they will completely destroy a field of twelve acres, and leave nothing but the bare stalks." To garden produce of the same sort, they are also very hurtful. They are common in most parts of Britain, frequenting plants of various kinds in damp places; and, possibly, it will be found that they are dangerous to farm and garden produce only in damp districts, like the Fens in England.

Remedies. Burning stubble, and rubbish of all kinds, is one means of destroying many of the beetles in their winter retreats. A change of crop for a year or two is recommended, with a view of starving out the insects; but, since they are common on Brooklime, Bittercress, and other plants inhabiting damp localities, this method can hardly be fully successful, except under special conditions. Probably, dressings such as have been found useful in attacks of a similar kind by other insects on Turnips, &c., would be found useful, *e.g.*, gas lime, soot, or sulphur, scattered alone or mixed, while the dew is on the plants, or after a shower. Probably, hand-picking would suffice to protect garden produce from serious injury. Anything that promotes vigorous, healthy growth is of much value in enabling the plants to resist injury from the attacks of the larvæ.

PHÆDRANASSA (from *phaidros*, gay, and *anassa*, a queen; alluding to the beauty of the flowers). Queen Lily. Including *Leperiza* (in part). ORD. *Amaryllideæ*. A genus comprising about six species of stove, greenhouse, or half-hardy bulbous plants, natives of the Andes of South America. Flowers showy, umbellate, reflexed; perianth greenish-red or two-coloured, narrow funnel-shaped or nearly cylindrical, the lobes long, narrow, and connivent, shortly spreading at the apex; involucral bracts two, or rarely three, narrow-linear; scape fistular. Leaves petiolate, narrow or rather broadly oblong. The species thrive best in a strong, yellow loam; when under greenhouse treatment, they should be kept comparatively dry during the winter months. The most suitable situation for them in the open air is under a south wall. Propagated by offsets.

P. Carmioli (Carmiol's).* *fl.* bright red, tipped with green, six to eight, drooping, about 2in. long; scape about 2ft. high. *l.* erect, lanceolate, as long as the scape, including the stalk. Costa Rica. 1868. Stove. (Ref. B. 46.)

Phædranassa—*continued.*

P. chloracea (greenish-yellow). *fl.* purplish-rose, tipped with green, upwards of 2in. long, with convolute limb segments. *h.* 1½ft. Peru, 1844. Greenhouse. (B. R. 1845, 17.) *P. obtusa* is a form with more obtuse segments.

P. eucrosioides (Eucrosia-like).* *fl.* drooping, about 1in. long, with a green tube and red segments; umbel three or four-flowered; scape terete, 12in. to 15in. long. *l.* one or two, petioled, oblong, acute, developing after the flowers. Ecuador, 1878. Stove. SYN. *Leperiza eucrosioides*.

P. Lehmanni (Lehmann's).* *fl.* scarlet, nodding, three in a pedunculate umbel; perianth tubular, 1in. long, with shortly spreading tips; stamens much exserted. *l.* solitary, stalked, elliptic-lanceolate, acute, dark green above, glaucous beneath. Columbia, 1884. Stove. (R. G. 1138.)

P. obtusa (blunt). A form of *P. chloracea*.

P. rubro-viridis (red and green).* *fl.*, perianth 1¼in. long; segments pale on the borders, keeled with green in the upper quarter, the rest with bright red; pedicels and spathe ½in. to ¾in. long; scape slender, bearing a few-flowered umbel. April. *l.* bright green, rather fleshy, acuminate, 1ft. or more long, three to four lines broad. Andes. Greenhouse. The correct name of this plant is *Eustephia coccinea*.

P. schizantha (cut-flowered). *fl.* contemporary with the leaves; perianth tube green, very short; segments bright red, shading off to salmon-colour at the tips, connivent, nearly 1½in. long. October. Pasto, Columbia, 1800. Stove or greenhouse.

P. viridiflora (green-flowered). *fl.* greenish-yellow, nodding, narrow-funnel-shaped, about four in an umbel; scape terete, 1ft. long. *l.* lanceolate, under 1ft. long, about 1½in. broad, bright green. 1877. Greenhouse.

PHÆNOCODON. A synonym of **Lapageria** (which *see*).

PHÆNOCOMA (from *phaino*, to shine, and *kome*, hair; referring to the colour and nature of the involucre). ORD. *Compositæ*. A monotypic genus. The species is a handsome, small, hard-wooded, evergreen shrub, separated from the genus *Helichrysum* by the central florets of the head being males only, and not hermaphrodite. It has a peculiar and interesting hoary appearance at all seasons of the year. The plant commences to blossom when in a small state, and remains in full beauty for nearly three months. It thrives best in good, brown, fibrous peat and coarse silver sand; proper drainage and watering are important elements in its culture. The best position for this plant in the greenhouse is one as near to the glass as possible; and, during summer and autumn, it may be kept in a cold pit, where plenty of air can be admitted on all fine days. Repotting may be done when the plants start into active growth during spring. Propagation is effected by cuttings of the young side shoots, getting firm at the base, inserted in sand over peat, in a very gentle heat.

P. prolifera (proliferous).* *fl.-heads* crimson, terminal, large, solitary; involucre of many rows of scales, the outer of which are short and appressed, and the inner long, radiating, shiny, and of a handsome rose-purple colour. Summer. *l.* glabrous, very small, scale-like, imbricated. *h.* 4ft. Cape of Good Hope, 1789. A variety known as *Barnesii* has its heads of a deeper crimson colour. SYNS. *Elichrysum proliferum* (B. M. 2365; B. R. 21), *Xeranthemum proliferum* (A. B. R. 374).

PHÆNOGAMOUS. A term applied to such plants as are visibly furnished with sexual organs.

PHÆNOGAMS. One of the two sub-kingdoms into which plants are divided. Phænogams, or Phanerogams, include all those plants which are provided with stamens, and ovules which, after fertilisation, become seeds containing an embryo. The two classes into which Phænogams are divided are: Dicotyledons, or Exogens, and Monocotyledons, or Endogens. Each of these classes is again sub-divided into groups, and these again into natural orders.

PHÆNOPODA. A synonym of **Podotheca** (which *see*).

PHÆNOSPERMA (from *phaino*, to shine, and *sperma*, a seed; alluding to the glistening seeds). ORD. *Gramineæ*. A monotypic genus. The species is a tall, hardy grass, thriving in any common soil. It may be increased by seeds, sown in spring.

Phænosperma—*continued.*

P. globosum (globe-seeded). *fl.* in a large panicle, with its slender branches scarcely branchleted; spikelets one-flowered; glumes four, slightly acute; style distinct; stigma plumose. *l.* flat. *h.* 6ft. China, 1874.

PHÆOSTOMA. Included under *Clarkia.*

PHAIUS (from *phaios*, shining; in allusion to the flowers). Frequently spelt *Phajus.* Syns. *Pachyne* and *Tankervillia.* Including *Limatodes, Pesomeria,* and *Thunia.* Ord. *Orchideæ.* A genus comprising about twenty-five species of tall, terrestrial or epiphytal, stove orchids, mostly tropical Asiatic, but also found in tropical Africa and the Mascarene Islands, Australia, the Pacific Islands, China, and Japan. Flowers yellow, violet, or white, few or many in a raceme, pedicellate: sepals free, sub-equal, spreading or erect; petals similar, but narrower; lip erect, concave or cucullate, spurred at base, or curved and produced continuous with the base of the column; lateral lobes large, erect, sometimes undulated and confluent with the middle lobe at apex; middle lobe expanded, spreading or recurved, frequently undulated at apex; column rather long, sub-terete, two-angled or two-winged, clavate at apex; scapes or

Fig. 101. Phaius grandifolius.

peduncles sometimes springing from the caudex, sometimes lateral or terminal. Leaves ample or elongated, folded, narrowed at base or contracted into a long petiole; sheaths often striate. The species are of tolerably easy culture. They thrive best in a compost of loam, leaf mould, and rotten cow-dung. Plenty of heat and moisture are essential during the growing season; but when at rest, the plants may be kept rather dry and in a cooler temperature. Propagated by dividing the bulbs after flowering. *P. grandifolius* is the best known species; it may readily be grown into large specimens.

P. albus (white).* *fl.* white, showy, three or four in a terminal, drooping raceme, shorter than the leaves; sepals and petals oblong-lanceolate, acute; lip nearly 2in. across, oblong, cucullate, denticulate, rounded at apex, the disk yellow, veined with rose, five-crested. *l.* oblong-lanceolate, acute, glaucous beneath, lower ones smaller, the lowest scale-like. Stem nearly 2ft. high. Nepaul, 1836. Syn. *Thunia alba.* (B. M. 3991; B. R. xxiv. 33.)

P. Bensonæ (Mrs. Benson's).* *fl.* of a bright rosy-purple, whitish towards the centre, large and showy, from 2in. to 3in. across; lip

Phaius—*continued.*

deep rich rosy-purple, with bright yellow crests on the disk; raceme short, produced from the top of the stem. July. *l.* subdistichous, linear-lanceolate, 6in to 10in. long, slightly glaucous beneath. Stems fascicled. Tubers nodose. *h.* 1ft. Rangoon, 1867. A beautiful plant. Syn. *Thunia Bensoniæ* (B. M. 5694).

P. Bernaysii (Bernays'). *fl.* pale yellow within, white without; lip three-lobed and white; scape from 2ft. to 3ft. high. *l.* lanceolate, plicate, dark green. *h.* 3ft. Queensland, 1873. This can only be distinguished from *P. grandifolius* by the pale yellow colour of the flower inside, and the labellum being also yellow, edged with white. (B. M. 6032, under name of *P. Blumei Bernaysii.*)

P. bicolor (two-coloured).* *fl.* 4in. in diameter; sepals and petals deep bright red-brown, linear-lanceolate; lip rose, yellow, and white, much broader, oblong, rolled round the column, much undulated at the edges, curved downwards at the upper end, at its base lengthened into a horn. *l.* 1½in. long, not tapering to a petiole, but rolled round each other. Stem naked below, covered with flowers above, 2ft. high. Rhizome fleshy, knobby, like that of an Iris. Ceylon, 1837. (B. M. 4078.)

P. Dodgsonii (Dodgson's).* *fl.* pure white, with the throat or base of the fringed lip of a pale cinnabar-red, disposed in terminal racemes. India, 1877. Probably only a fine variety of *P. albus.*

P. grandifolius (large-leaved).* *fl.* from 3in. to 4in. across; sepals and petals of a brownish colour within, and white without, lanceolate; lip convolute, white, with a dark crimson-brown throat; spikes 2ft. to 4ft. high, many-flowered, well adapted for cutting. January to March. *l.* broadly lanceolate, 2ft. to 3ft. long. *h.* 3ft. China to Australia, 1778. A noble evergreen orchid, one of the best for exhibition purposes. See Fig. 101. Syns. *Bletia Tankervilliæ* (B. M. 1924), *Limodorum Tankervilliæ* (A. B. R. 426). There is a handsome variety, *superbus* (F. d. S. vii. 738).

P. Humblotii (Humblot's). *fl.* rosy, with white and red blotches, large; lip spurless, having a saddle-like callus on its disk, running out in a small keel; raceme few-flowered. Madagascar, 1880. A beautiful species.

P. inquilinus (tenant). *fl.* cream-colour, the three keels of the lip being yellowish-white. 1867. A hybrid form, the parents of which are unknown.

P. irroratus (bedewed).* *fl.* large; sepals and petals rich cream-colour, tipped with rosy-pink; lip nearly round, creamy-white, stained with yellow at the base; spike erect. 1867. A very handsome form, the result of a cross between *P. grandifolius* and *Calanthe vestita.* (G. C. 1867, p. 264; G. C. n. s., xviii. 565.)

P. maculatus (spotted). *fl.* rich yellow, borne on short spikes in great profusion. Spring. *l.* long, dark green, spotted with yellow. Pseudo-bulbs large, somewhat ovate. *h.* 2ft. India, 1823. A showy and desirable plant, not often seen in cultivation. (B. M. 3960; L. B. C. 1803.) Syn. *Bletia Woodfordii* (B. M. 2719).

P. Marshalliæ (Mrs. Marshall's).* *fl.* white, large; lip marked on the upper part with a little yellow, the lower part beautifully fringed. June. *h.* 2ft. Moulmein, 1871. A lovely plant, well suited for exhibition purposes, and continuing to throw fresh blossoms for a long time. Syn. *Thunia Marshalliæ.*

P. tetragonus (tetragonal). *fl.* reddish-brown internally, and greenish externally; sepals and petals similar in shape, &c.; lip yellow, streaked with orange-red, undivided, cucullate, parallel with, and partly surrounding the column, with the lower part of which it is adnate, and forms a slight protuberance at the bottom; peduncles lateral, bearing a loose spike of eight to ten rather large blossoms. Winter. *l.* broad, membranous, long-pointed. Stems sharply four-angled, jointed, 1ft. or more high. Mauritius, 1837. (B. M. 4442, under name of *Pesomeria tetragona.*)

P. tuberculosus (tubercled).* *fl.* snow-white; lip very fine, funnel-shaped below, with wide, yellowish lateral lobes, covered over and over with brown blotches, on an anterior, obcordate, wavy, middle lacinia, white, with mauve marginal spots; spikes four to six-flowered, erect. Spring. *l.* oblong, plicate, 1ft. long. Stem slender and twisted. Madagascar, 1881. (Gn., July 19, 1884; G. C. n. s., xviii. 565.)

P. Wallichii (Dr. Wallich's).* *fl.* orange-yellow, or buff tinged with purple, from 4in. to 5in. across; lip yellow, with a brown throat; spikes tall, upright, 3ft. to 5ft. high. March to May. *h.* 4ft. to 5ft. Khasya Hills, India, 1837. A vigorous-growing plant, similar in habit to *P. grandifolius.*

PHAJUS. *See* **Phaius.**

PHALACRÆA. Included under **Piqueria** (which *see*).

PHALACROLOMA. Included under *Erigeron.*

PHALACROMESUS. A synonym of **Tessaria** (which *see*).

PHALÆNOPSIS (from *phalaina*, a moth, and *opsis*, resemblance; referring to the appearance of the flowers). Moth Orchid. Including *Polychilos.* Ord. *Orchideæ.* A genus comprising about a score species of very handsome stove, epiphytal orchids, having short, leafy stems instead of pseudo-bulbs, natives of the Malayan Archipelago and the Eastern provinces of India. Flowers showy, loosely

Phalænopsis—*continued.*

racemose, shortly pedicellate; sepals and petals flatly spreading, the latter much larger and wider than the former; lip three-lobed, free, continuous with the prolonged base of the column, and furnished with a callosity at its base; column semi-terete, thickened upwards; anther two-celled, containing two pollen masses, attached by a strap-shaped caudicle to a cordate gland; peduncles lateral, simple or branched. Leaves few, broad, thick, leathery, two-ranked, notched at the top. Some of the plants described below as species are probably natural hybrids.

The species of *Phalænopsis* rank among the most beautiful of the numerous Orchids in cultivation. One or another of the representatives of the genus may be seen in flower nearly the whole year round. The plants require careful treatment, and the heat of a house devoted to East Indian Orchids. In nurseries and a few private gardens, where a large collection or quantity of these plants are grown, it is customary to devote structures specially to them; this is most satisfactory, where practicable, as the proper treatment can be more readily given than would be the case if other plants were intermixed. Where, however, there is not an orchid-house in existence, a few specimens of *Phalænopsis* may, with extra attention, be successfully cultivated in an ordinary stove. It is important to remember that the plants are natives of hot countries, where they are deluged with water in the rainy season. They are found growing on rocks, and on branches of trees, in damp places. Not having any pseudo-bulbs in which nutriment and moisture may be stored, and the evaporating leaf surface being somewhat great, it is essential that, in the growing season, plenty of water must be given, and sufficient moisture provided at all times, according to weather, to prevent the plants suffering for want of it. The growing season is from March until October, inclusive. During this interval, the minimum day temperature should be from 70deg. to 75deg., allowing a rise to 80deg. or more with sun heat; the night temperature being about 65deg. In winter, 60deg. to 65deg. should be taken as a minimum. Established plants of Phalænopsids require plenty of light, but they must not be exposed to the summer's sun. If this is allowed, the foliage is liable to become scorched and disfigured, and injury to the plant will also ensue. A thin, movable shading, that can easily be applied or removed, should be provided. It is most usual to suspend the plants from the roof; but they should not be hung too near, on account of their liability to injury from cold. If grown in pots or cylinder baskets, they should be arranged on a bed or stage near the glass.

Phalænopsids may, under judicious treatment, be successfully grown in pots, in baskets, or on blocks. Drainage is of the utmost importance: epiphytal Orchids are quite unable to withstand anything approaching stagnant moisture. Clean potsherds, broken about ½in. square, should be used in pots or baskets, so as to fill nearly up to the rim; or a small, inverted pot may be placed inside for assisting in the drainage. Good sphagnum, with a few pieces of fibrous peat and nodules of charcoal, should be placed in sufficient quantity above the drainage to allow the plant to rest on it at a height, in the centre, of 3in. above the rim or edge. The surface should be covered, after the plant is fixed in position, with living sphagnum. Careful shading and watering will be requisite for some time afterwards.

Phalænopsis—*continued.*

The shallow pots or pans specially made for Orchids are well adapted for species of *Phalænopsis*. They can be readily suspended or taken down, and always present a neat appearance when in use. If grown on blocks, a little peat and sphagnum should be placed beneath the plant, which should then be surrounded with sphagnum, and fixed in position with a small piece of wire. An important point in management is that of ventilation. Air should be admitted in summer whenever it may be done with safety; but the ventilators should be placed near the pipes, so that the air may become warmed before reaching the plants. Damping of the stage and floor, on bright days, should be performed chiefly in the morning, so that it may become nearly dried up by night; and drip must be carefully guarded against. To keep the foliage clean, and remove Thrips, which are often troublesome, the leaves should be carefully sponged occasionally with clean, tepid water. Should fumigating become a necessity, it must be conducted with very great care.

Propagation is very difficult, as the plants seldom afford an opportunity for division. *P. Luddemanniana* is more easily increased than any of the others; it produces young plants upon the flower stems. Occasionally, some of the other species will also similarly multiply; and *P. Stuartiana* sometimes produces young plants upon its roots. When this takes place, these young plants should be left until they form roots of their own, when they may be placed separately on small blocks.

FIG. 102. PHALÆNOPSIS AMABILIS.

P. amabilis (lovely).* *fl.* varying considerably in size, sometimes exceeding 5in. in diameter; sepals and petals pure white and rounded, of great substance; lip having a few bright yellow streaks; panicle usually very fine, and branching. Autumn. *l.* light green. Java, 1847. A remarkably handsome species, closely allied to *P. Aphrodite*, and distinguished chiefly by the larger flowers, colour of the lip, and in the longer and lighter green shade of the leaves. See Fig. 102. (B. M. 5184, under name of *P. grandiflora*.) A variety named *aurea* has the colouring of the lip much darker and richer than usual.

P. amethystina (amethyst).* *fl.* comparatively small, loose; sepals and petals white, spreading; lip white, tinged with yellow at the base, centre part rich amethyst, suffused with purple, and deeply emarginate in front; peduncle simple or branched, 4in. to 12in. long, slender at the base, thicker towards the apex; bracts small, pointed. *l.* stout, rigid, oblong, 3in. to 4in. long, 2in. to 2½in. broad, margins undulate. Sunda Isles (?), 1869. An elegant but small-growing species. (G. C. 1870, 1731.)

P. antennifera (antennæ-bearing). *fl.* rose-coloured, in a spike 2ft. long, having small, spreading, linear, side lobes to the stalk of the lip; these, and the basal antennæ, are deep orange, the front lobe purple. Burmah, 1879. This plant much resembles *P. Esmeralda*.

P. Aphrodite (Aphrodite).* *fl.* about 3in. across; sepals and

Phalænopsis—*continued.*

petals pure white, the latter larger and more rounded than the former; lip three-lobed, white, frequently marked with a few streaks of crimson, orange, and yellow; racemes long, branched, and having the blossoms arranged in a distichous manner. Flowering nearly all the year round. *l.* bright green, elliptical, broad, thick, flat, arranged very close together in a two-ranked manner. Manilla, 1836. A beautiful species, remaining a long time in perfection if the flowers are kept free from damp. (B. 133; B. M. 4297; B. R. 1833, 34, under name of *P. amabilis.*) There are several very desirable forms of this plant.

P. Boxallii (Boxall's). *fl.*, sepals and petals sulphur-coloured, the former barred and blotched with brown, and the latter with three longitudinal stripes; front lobe of lip white, crescent-shaped, with blunt angles and a central tubercle; lateral lobes erect; disk with a short, bicuspate, yellow lobe, with a mauve and white keel in front. Philippines, 1883.

P. casta (chaste). *fl.* white, slightly tinged with purple. *l.* slightly spotted in the young state only. Philippines, 1875. This is supposed, by Reichenbach, to be a natural mule.

P. Corningiana (Corning's). *fl.*, upper sepal striped and barred with purple-brown; lateral ones almost wholly purple-brown, with border and a few spots yellowish-white; petals longitudinally striped and blotched; lip bent immediately before its claw with a yellow callus, and the central part rich purple-violet; a tuft of hairs on the front middle line. 1879. A very striking plant, somewhat resembling *P. sumatrana.*

P. Cornu-cervi (stag's horn). *fl.* of medium size; sepals and petals yellow, tinged with green, and barred and striped with brown; spike thickened and flattened at the top where the flowers are situated. *l.* bright green, 8in. or more in length. Moulmein, 1864. A very pretty species, allied to *P. Mannii.* (B. M. 5570, under name of *Polychilos Cornu-cervi.*)

FIG. 103. PHALÆNOPSIS ESMERALDA.

P. Esmeralda (Esmeralda).* *fl.* rose coloured, 1in. in diameter; lateral lobes of lip oblong, erect; middle lobe obtuse, decurved; raceme few-flowered; scape 1ft. high. *l.* distichous, spreading, 8in. long, 2in. broad, somewhat granulose, marbled. Cochin China, 1877. A small but pretty species. See Fig. 103. (F. M. n. s. 358.)

P. fuscata (dusky). *fl.* yellowish, mottled with brown, medium-sized, very fleshy; lip very peculiar. *l.* large, oblong, bluntly acute. Malaya, 1874. Similar to *P. Cornu-cervi.*

Phalænopsis—*continued.*

P. intermedia (intermediate). *fl.* of moderate size; sepals and petals white, shaded with rose; lip small, of a deep rosy-purple hue. *l.* light green. Philippines, 1867. A very desirable natural hybrid, although not so showy as many others; it has also been recently artificially produced by Messrs. Veitch. It has two extremely pretty varieties: *Brymeriana* (F. M. n. s. 263) is chiefly distinguishable by the lip being white and marked with crimson; *Portei* (G. C. n. s., v. 369, 371) surpasses the typical species in the fine, branching spikes bearing more numerous, larger flowers, the colouring being similar, but the contrast of tint between the lip and other portion of the flower being more distinctly marked. Both type and varieties are very rare.

P. leucorhoda (white-and-rose). *fl.*, sepals and petals white, tinged in the centre with rose; column rose. Philippines, 1875. A handsome and distinct form, supposed to be a natural hybrid between *P. amabilis* and *P. Schilleriana.*

P. Lowii (Low's). *fl.* comparatively small; sepals and petals white, tinged with rose, round; lip bright rosy-purple. *l.* broad, somewhat thin in texture, dark green. Borneo, 1862. A very remarkable species, said to grow upon exposed rocks in Moulmein, where, at one time of the year, the rains are extremely heavy, and, at another, the heat and drought are so great that the plant loses its leaves and appears to be almost dead, but revives with the return of the wet season. (B. M. 5351.)

P. Luddemanniana (Luddemann's).* *fl.* medium-sized; sepals and petals white, transversely barred with brown towards the points, the lower portion being barred with violet-purple; lip rather long, having its centre richly marked with deep violet; spikes sometimes exceeding 2ft. long, and remaining in beauty for two months. *l.* bright green, 8in. or more in length. Philippine Islands, 1865. Very distinct and beautiful; much more easily increased than the other species of the genus. (B. M. 5523.)

P. L. pulchra (pretty). *fl.* beautiful port-wine colour; lower part of petals, sepals, and lip, and base of column, shining amethyst-blue. Philippine Islands, 1875.

P. Mannii (Mann's). *fl.* about 2in. broad; sepals and petals yellow, with many cinnamon-brown dots and blotches; lip three-lobed, the lateral lobes erect, the central one lunate and fringed, white and purplish; column yellow; peduncle several-flowered. *l.* cuneate-oblong, ligulate, acute, green, with a delicate violet border and many violet spots on the base. India, 1871.

P. Mariæ (Mrs. Mary Burbidge's). *fl.* moderate-sized; sepals and petals white, with transverse blotches of chocolate-red and one or two magenta-purple spots at their base; lip rich magenta-purple, with a white edge. *l.* oblong, dark green, distichous, drooping. Borneo (?), 1883. (W. O. A. 80.)

P. Parishii (Parish's).* *fl.* cream-coloured, except the lip, which is purple, diminutive, disposed in short spikes. *l.* oblong-ligulate, rather blunt. Burmah, 1865. A curious little epiphyte. (B. M. 5815.) The variety *Lobbii* has a white lip with two brown bands. 1870.

P. Reichenbachiana (Reichenbach's).* *fl.* large, disposed in many-flowered racemes; sepals and petals waxy whitish-green, with brown markings; side lobes of the lip orange and white, the central lobe mauve-blue. 1883. A fine species.

P. rosea (rosy). *fl.* rather small; sepals and petals white, slightly tinged with pink; lip deep violet in the centre, the side lobes stained with rich orange; spikes sometimes fourteen-flowered, eventually elongated. *l.* somewhat oblong, slightly broadest at the apex, bright green. Manilla, 1848. A pretty species. (B. M. 5212.)

P. Sanderiana (Sander's).* *fl.* of various rosy tints, large; lip white with brown and purple stripes, and some yellow. *l.* mottled. 1883. A fine plant. (W. O. A. 209.)

P. S. marmorata (marbled). *fl.*, sepals and petals yellowish-white outside, the lateral ones with rows of small, purple spots at their base; lip marked with purple spots and stains.

P. Schilleriana (Schiller's).* *fl.* often measuring more than 2½in. across, arranged in two rows along the spike; the rounded petals and narrower sepals of a fine rosy colour, varying in intensity in different plants; lip three-lobed, the lateral lobes rose-coloured, the central one white, with yellow protuberances at the base; peduncle frequently 3ft. in length, branched, occasionally bearing nearly 100 blossoms. *l.* arranged in a similar manner to those of *P. Aphrodite*, but much longer and broader, marbled or mottled with light green on a rich green ground. Roots remarkable in being flat, and having a rough appearance. Manilla, 1860. A very beautiful species, the best yet in cultivation, and equally attractive when in or out of flower. See Fig. 104. (B. M. 5530; R. X. O. 101.)

P. S. immaculata (immaculate). *fl.* rosy-tinted, without dot or blotch; lateral laciniæ of lip pure white, edged with violet, the callus pure yellow. Philippine Islands, 1875.

P. speciosa (showy).* *fl.*, sepals and petals white, blotched and striped with rose-madder, lanceolate, acuminate; lip clavate, papillose at the apex, with small, basal, erect side lobes, rosy-purple, with two yellow spots on the side lobes. 1883. Of this handsome plant, the following are varieties: *Christiana*, with broader sepals and petals, the former rose-madder, the latter white (G. C. n. s., xviii. 131); *imperatrix*, a larger form, with rose-purple flowers.

Phalænopsis—*continued.*

P. Stobartiana (Stobart's). *fl.*, sepals and petals apple green, ultimately yellowish-green; lip amethyst-colour, the lateral partitions marked with yellow and white, the amethyst-colour finally changing into a nearly cinnabarine-red. 1877. Allied to *P. amethystina.*

P. Stuartiana (Mr. Stuart-Low's).* *fl.* cream-coloured; the sepals are outside of a light sulphur, and inside the inferior halves of the lateral sepals of the same colour, with dark cinnamon blotches; side laciniæ of the lip pure white at the top; panicle many-flowered. *l.* broad ovate, spotted when young. 1881. A lovely species. (B. M. 6222; F. & P. 559; G. C. n. s., xvi., pp. 748, 751; R. G. 1130.)

P. sumatrana (Sumatran). *fl.* about 3in. wide; sepals and petals yellowish-white, branded or barred with streaks of reddish-brown; lip white, spotted with orange, and streaked down the centre with violet; spike about 6in. long, from five to ten-flowered. *l.* acuminated, 6in. to 7in. long, somewhat fleshy, bright green. Sumatra, 1855. (B. M. 5527.)

P. s. sanguinea (bloody). A fine variety, having the lateral sepals nearly wholly dark red, with very few yellowish-green markings. Borneo, 1881.

FIG. 104. PHALÆNOPSIS SCHILLERIANA.

P. tetraspis (four-horned). *fl.* white, disposed in a rich panicle; lateral lobes of lip ligulate, with a tooth at the upper end, and a conical callus in the middle, between the lobes two pairs of bristle-like processes; front lobe of lip rhomboid-ligulate, with a cushion of hairs at the apex. *l.* very fine. East Indies, 1881.

P. Valentini (Valentine's). *fl.*, sepals and petals purple, white inside at the base, and having some purple bands; lip mauve, white, and yellow. 1883.

P. Veitchiana (Veitch's).* *fl.* resembling those of *P. Schilleriana*, but smaller, purplish; lip purplish-white, with dark purple spots. *l.* cuneate-oblong, obscurely tessellated. Philippine Islands (?), 1872. (F. M. n. s. 213.)

P. V. brachyodon (short-toothed). *fl.*, sepals and petals white, the base of the lateral sepals having some brown spots; front lobe of lip dark purple, side lobes with purple tips. 1884.

P. violacea (violet).* *fl.* rather closely set along the spike, almost from its base, fully 2in. across; sepals and petals white, delicately washed with violet-rose in the lower or basal portions; lip rich violet-crimson, relieved by the golden-yellow callus; column violet-crimson. *l.* light cheerful green, as large as those of *P. Schilleriana.* 1861. A handsome species. (F. M. 1879, 342.) The variety *Murtoniana* (G. C. n. s., xvi. 145) is very desirable; it has fine lemon-yellow flowers, marked with a purplish colour.

PHALANGES. Stamens joined by their filaments, or arranged in bundles.

PHALANGIUM. A synonym of *Anthericum.*

PHALARIS (the old Greek name used by Dioscorides). ORD. *Gramineæ.* A genus comprising nine or ten species of annual or perennial, greenhouse or hardy grasses, mostly found in the Mediterranean region and extra-tropical America, a few being natives of Africa and Australia. Inflorescence in spike-like or capituliform panicles; the spikelets with one perfect flower, and generally the rudiments of two imperfect ones, which latter form minute scales between the outer, empty glumes; glumes usually six. Leaves flat. The under-mentioned hardy species are of easy culture in common garden soil. Propagated by seeds, or by divisions of the plant.

P. arundinacea (Reed-like).* *fl.*, panicle erect, loose, about 6in. long, tinged with purple. July. *l.* lanceolate, striated, smooth. *h.* 3ft. to 5ft. North temperate and Arctic regions (Britain). Perennial. (Sy. En. B. 1697, under name of *Digraphis arundinacea.*)

P. a. variegata (variegated). Gardener's Garters; Lady's Garters; Ribbon Grass. A form with striped leaves very common in gardens. *P. gigantea* is a stouter and taller-growing form.

P. canariensis. Canary Grass. *fl.*, panicle erect, ovate, close, compound, resembling an ovate spike, beautifully variegated with green and white. July. *l.* flat, lanceolate, upper sheaths inflated. *h.* 1½ft. South Europe, North Africa, West Asia. Annual. This species supplies the well-known "canary seed," so much employed as food for singing cage-birds. (Sy. En. B. 1698.)

PHALERIA (from *phaleros*, shining white; alluding to the colour of the flowers). SYN. *Drimyspermum.* ORD. *Thymeleaceæ.* A genus comprising about eight species of stove or greenhouse trees or shrubs, natives of Ceylon, the Malayan Archipelago, and Australia. Flowers sessile, in terminal, or rarely lateral, usually numerous heads; perianth tube cylindrical elongated; lobes four or five, rarely six, spreading; bracts leafy. Leaves opposite. *P. laurifolia*, the only species introduced, thrives in a compost of rich, light loam and fibry peat. It may be propagated by seeds, sown on a hotbed in spring; or by cuttings of the young shoots, inserted in sand, under a bell glass, in bottom heat.

P. laurifolia (Laurel-leaved). *fl.* white, disposed in terminal, many-flowered heads; peduncles two lines long, scaly-bracted. *l.* shortly stalked, oblong or elliptic-oblong, 3in. to 5in. long, 1in. to 1½in. broad, slightly acuminate at both ends, glabrous. *h.* 6ft. Ceylon, 1869. Stove shrub, remarkable for the delicious Daphne-like scent of the flowers. (B. M. 5787.)

PHALLARIA. A synonym of **Plectronia** (which *see*).

PHALLOCALLIS PLUMBEA. A synonym of *Cypella plumbea.*

PHANEROGAMOUS. The same as **Phænogamous** (which *see*).

PHANEROPHLEBIA. Included under *Aspidium.*

PHARBITIS. Included under **Ipomœa** (which *see*).

PHARIUM. A synonym of *Bessera.*

PHARNACEUM (named after Pharnaces, King of Pontus, who lived contemporary with Cæsar and Pompey). SYN. *Ginginsia.* ORD. *Ficoideæ.* A genus comprising about sixteen species of annual or perennial, low, erect or decumbent, greenhouse, South African herbs, often suffrutescent at base. Flowers greenish or purplish, in axillary, racemiform, umbelliform, or compound or terminal-pedunculate cymes. Capsule membranous. Leaves alternate or pseudo-verticillate, linear, acicular, obovate, or spathulate, often setiferous at base. The species possess little beauty, and are more suited to botanical than to horticultural collections. Those mentioned below thrive in a compost of sandy loam and peat, and cuttings root readily in the same kind of soil, if placed under a glass.

P. incanum (hoary). *fl.* white inside, green without, disposed in proliferous umbels; common peduncles very long. May to October. *l.* scattered, or four in a whorl, with bundles of smaller leaves rising from the axillæ, smooth, linear; stipules pilose. Stems erect; branches white from stipules. *h.* 6in. 1782. Shrubby. (B. M. 1883.)

P. lineare (linear). *fl.* reddish, in panicled, terminal and lateral umbels. May and June. *l.* linear, obtuse, six to eight in a whorl. Stems prostrate; branches dichotomous. 1795. Shrubby. (A. B. R. 326.)

PHARUS (from *pharos*, a covering; the leaves are used for thatching and other purposes). ORD. *Gramineæ*. A genus comprising about five species (which, however, are closely related) of stove grasses, natives of tropical America, from Brazil to Mexico and Florida. Flowers in a large, terminal, loosely compound panicle, with elongated, slender, often divided branchlets; spikelets unisexual, monœcious, one-flowered, the females two or three times longer than the males. Leaves long-stalked, ample, acuminated, oblique; petioles twisted, often reversed. *P. latifolius*, the only species introduced, requires culture similar to **Bambusa** (which *see*).

P. latifolius (broad-leaved). *fl.*, fertile glume little longer than the sterile pair, villous to the base; female spikelets nearly ½in. long. July. *l.* obovate-oblong or elliptic-oblong, cuspidate, scabrous beneath, 6in. to 8in. long, 1½in. to 2½in. broad. *h.* 1½ft. to 3ft. Jamaica, 1796.

P. l. vittatus (banded).* A finely variegated form, with foliage banded with white or flushed with rose. (F. d. S. 316, under name of *P. vittatus*.)

PHASEOLUS (the old Greek name used by Dioscorides, probably from *phaselus*, a little boat; referring to a supposed resemblance in the pods). Kidney Bean. ORD. *Leguminosæ*. A rather extensive genus (about sixty species) of twining, prostrate, or short and erect, stove, greenhouse, or hardy, annual or perennial herbs, rarely woody at base, broadly dispersed over the warmer regions of the globe. Flowers white, yellow, red, violet, or purplish, fasciculately racemose on knot-like protuberances above the middle of the axillary peduncles; upper calyx lobes or teeth connate or free; standard orbiculate; wings obovate or rarely oblong; keel linear or obovate, terminating in a long, spirally-twisted point. Pods linear or falcate, sub-terete or compressed. Leaves pinnately trifoliolate, stipellate, very rarely unifoliolate; stipules persistent, striated; bracts often caducous, stipuliform or small; bracteoles often broad. Few of the species are of any horticultural value. For culture of *P. vulgaris*, *see* **Beans**. The stove species require similar treatment to **Dolichos** (which *see*).

P. Caracalla (Caracalla). Climbing Snail Flower. *fl.* purple and yellowish mixed, large; vexillum and carina spirally twisted; racemes longer than the leaves. August. *l.*, leaflets ovate-rhomboid, acuminated. India, 1690. Plant twining, hardly pubescent. Stove perennial. (A. B. R. 341; B. R. 341.)

P. lobatus (lobed-leaved). *fl.* yellow, in dense racemes; peduncles axillary, solitary, many-flowered; standard and wings more or less twisted; keel with an extraordinary, spirally-twisted, acuminate point. September. *l.* copious, ternate; leaflets hastately trilobed, the terminal one on a long footstalk, the lateral ones almost sessile. Stem twining. Buenos Ayres. Greenhouse perennial. (B. M. 4076.)

P. semi-erectus (slightly-erect). *fl.*, vexillum greenish, tinged with purple; keel purple in the middle, but white on the sides; wings deep purple; peduncles elongated. July. *l.*, leaflets ovate-lanceolate, acute, glabrous. Stems twining at the apex. South America, 1781. Stove annual. (B. R. 743.)

P. vulgaris (common). Dwarf, or French Kidney Bean. *fl.* variable, usually white or lilac; racemes pedunculate, shorter than the leaves; pedicels twin. June to September. *l.*, leaflets ovate, acuminated. Plant twining, smoothish. Tropical and temperate regions; "universally cultivated, but not anywhere clearly known as a wild plant" (Baker). 1597. Tender annual. *See also* **Beans**.

P. v. multiflorus (many-flowered). Scarlet Runner. This differs from the type by its bright scarlet, casually white, flowers, arranged in long racemes, which often overtop the leaves. *See* **Beans**.

PHEASANT'S EYE. A common name for *Adonis æstivalis*, *A. autumnalis*, and *Dianthus plumarius*.

PHEBALIUM (from *Phibale*, a Myrtle; alluding to the appearance of the species). ORD. *Rutaceæ*. A genus comprising (according to Bentham) twenty-eight species of greenhouse, glabrous or stellate-pubescent, scaly or rarely hirsute shrubs or small trees, of which one is a native of New Zealand, and the rest are all South Australian. Flowers white or yellow, small, very rarely four or six-merous; calyx segments and petals five, the latter valvate or laterally imbricated, but always with valvate, inflexed tips; inflorescence axillary or terminal; peduncles usually forming a short, umbel-like raceme,

Phebalium—*continued.*

rarely one-flowered or reduced to a compact head. Leaves alternate, simple, entire or slightly toothed, the glands often large and prominent. The species require a compost of three parts sandy peat and one of sandy loam. Propagation may be effected by cuttings of the young wood, inserted in sand, under a glass. The undermentioned species are all Australian.

P. aureum (golden). A synonym of *P. squamulosum*.

P. Billardieri (Labillardière's). *fl.* yellow, in axillary corymbs, shortly pedunculate, but always shorter than the leaves; peduncles and pedicels scaly. April. *l.* oblong, lanceolate, or linear, obtuse or acute, rarely under ½in. and often 3in., sometimes 4in. to 5in. long, silvery-white beneath, with minute scales. 1822. An erect shrub or small tree. SYN. *P. elatum*.

P. elatum (tall). A synonym of *P. Billardieri*.

P. lachnoides (woolly). *fl.* yellow, on short, axillary pedicels, usually crowded near the ends of the branches. May. *l.* crowded, narrow-linear, obtuse or scarcely mucronate, rarely exceeding ½in. long, the margins revolute, glabrous above, hoary beneath. Branches minutely stellate-pubescent. *h.* 3ft. 1824.

P. squamulosum (slightly scaly). *fl.* yellow, in terminal, sessile, simple or compound umbels or corymbs, not exceeding the last leaves; pedicels, calyx, and petals covered with comparatively large scurfy scales. May. *l.* shortly petiolate, oblong or linear, obtuse, but often mucronulate, ½in. to 1½in. long, the margins flat or slightly recurved, smooth above or slightly glandular-tuberculate, covered underneath with scurfy peltate scales. Young branches brown, with scurfy scales. *h.* 2ft. 1824. SYN. *P. aureum*.

PHEGOPTERIS. Included under **Polypodium** (which *see*).

PHELIPÆA (named after the Philipeaux family, patrons of the botanist Tournefort). SYNS. *Anoplanthus* (in part), *Macranoplon* (in part). ORD. *Orobanchaceæ*. A genus comprising only a couple of species of singular and beautiful, puberulous or glabrous, hardy, leafless, Oriental herbs. Flowers scarlet, large, ebracteolate, always solitary, on a few-scaled, elongated scape or naked peduncle; calyx broadly campanulate, cut into five unequal, acute lobes; corolla tube broadly ventricose, incurved; limb large, spreading, sub-bilabiate, with five broadly rotundate, scarcely unequal lobes. "Only one species has yet been successfully cultivated. It is a hardy perennial (?), parasitical upon the roots of *Centaurea dealbata*. The seeds should be sown with those of the Centaurea, together, in the same pot, when probably some will germinate, fasten themselves upon the roots of the seedling Centaureas, and develop into plants" (N. E. Brown).

P. foliata (leafy). *fl.*, corolla inflated, ventricose; tube nearly 1in long; limb nearly 1in. in diameter, the throat having two dark velvety spots; stamens inserted below the middle of the tube; scape 1ft. long, terete, somewhat flexuous, striated, glabrous, or somewhat puberulous at apex; scales semi-amplexicaul, sheathing, remote. Caucasus, 1880. SYNS. *Anoplanthus Bieberstein* (R. G. 1000), *A. foliata*.

PHENAKOSPERMUM. Included under *Ravenala*.

PHEROTRICHIS. A synonym of **Lachnostoma** (which *see*).

PHIALIS. A synonym of *Bahia*.

PHILADELPHEÆ. Included under *Saxifrageæ*.

PHILADELPHUS (an ancient Greek name, meaning brotherly love, applied, by Athenæus, to a different plant). Mock Orange; Syringa. ORD. *Saxifrageæ*. A genus comprising about twelve species of hardy, ornamental shrubs, natives of central Europe, temperate North America, Japan, and the Himalayan Mountains. Flowers white or straw-coloured, often sweet-smelling, axillary, solitary or corymbose, bracteate; calyx tube turbinate, adnate to the ovary; lobes four, rarely five, valvate; petals four, rarely five, rotund or obovate, convolute; stamens twenty to forty. Leaves opposite, deciduous, entire or serrate, often covered with stellate down; stipules wanting. Branches rather terete, opposite. The species are of easy culture in any fairly good soil. The plants flower on the wood of the previous year; this may be cut away when flowering is over, and

Philadelphus —*continued.*

FIG. 105. FLOWERING BRANCHLET OF PHILADELPHUS CORONARIUS.

the new growths encouraged to take its place for the year immediately following. In this way, the shrubs, though large, may be kept within limited bounds, and encouraged to flower more freely because of the wood becoming better ripened. Propagated, in spring, by

FIG. 106. FLOWERING TWIG OF PHILADELPHUS CORONARIUS PRIMULÆFLORUS (natural size).

Philadelphus—*continued.*

suckers, by layers, or by cuttings of the young shoots, struck under glass, either in heat, or in a moist, cold frame.

P. chinensis (Chinese). A synonym of *P. Satzumi.*

P. coronarius (garland).* Common Mock Orange or Syringa. *fl.* white, with a strong, orange-like scent, racemose. May. *l.* ovate, acuminated, serrately denticulated, smoothish, having the odour and taste of cucumbers, when crushed. Stems stiff, straight. *h.* 2ft. to 10ft. South Europe, &c., 1596. A handsome species. See Fig. 105. (B. M. 391.) There are several forms, including some with double flowers, one of which (*primulæflorus*) is shown in Fig. 106; another, in which the leaves are edged with white or yellow; and a third, with golden-yellow leaves. *nanus*, a dwarf form, is sometimes seen in cultivation.

P. Gordonianus (Gordon's).* *fl.* white, scentless, and produced in great abundance; racemes terminal, compact, five to nine-flowered. July. *l.* ovate, acuminate, serrulate. *h.* 10ft. North-west America. See Fig. 107. (B. R. 1839, 32.)

P. grandiflorus (large-flowered).* *fl.* white, large, sweet-scented. June. *l.* pubescent when young, ovate-acuminate or nearly rotundate, irregularly toothed. Stems rather slender, twiggy. *h.* 6ft. to 10ft. South United States, 1811. SYN. *P. speciosus.* (S. B. F. G. ser. ii. 8.)

P. g. laxus (loose). *fl.* white, solitary and in threes. June. *l.* ovate, long-acuminated, toothed, clothed with hairy pubescence beneath. *h.* 4ft. to 6ft. North America, 1830. (B. R. 1839, 39.)

FIG. 107. FLOWERING BRANCH OF PHILADELPHUS GORDONIANUS.

P. hirsutus (hairy).* *fl.* white, solitary and in threes. June. *l.* oblong-ovate, acute, toothed, hairy on both surfaces, white beneath. *h.* 3ft. North America, 1820. (B. M. 5334; S. B. F. G. ser. ii. 119.)

P. inodorus (scentless).* *fl.* white, large, scentless, solitary and in threes. June. *l.* broad-ovate, acuminate, entire. *h.* 4ft. to 6ft. Mountains of Virginia and southward, 1738. (B. M. 1478.)

P. Lewisii (Lewis'). *fl.* white, smaller than those of *P. hirsutus*, solitary and in threes. June. *l.* ovate, acute, almost entire, with ciliated margins. *h.* 6ft. to 8ft. North America, 1739.

P. microphyllus (small-leaved). *fl.* terminal, solitary or in threes. Summer. *l.* ¼in. to ¾in. long, ovate-lanceolate or oblong, entire, slightly obtuse, obsoletely triplinerved, minutely pilose beneath. Branches slender, erect. New Mexico, 1883.

P. Satzumi (Satsum's). *fl.* white, about 1½in. across, produced in pairs at the ends of the shoots. July. *l.* long, narrow. *h.* 5ft. Japan, 1951. A slender-growing plant. SYN. *P. chinensis.*

P. speciosus (showy). A synonym of *P. grandiflorus.*

PHILAGERIA (a combination of parts of the generic names of the two parents). ORD. *Liliaceæ*. A monotypic garden hybrid genus, raised by Messrs. Veitch, between *Philesia buxifolia* and *Lapageria alba*. The plant is a half-hardy, scrambling shrub, with slender, flexuous branches. In habit, *Philageria Veitchii*, is, according to Dr. Masters, "more akin to the female parent (*Lapageria*) than to the male. Its foliage is singularly intermediate, but at the same time nearest like that of the pollen parent (*Philesia*). In the characters of the flower-stalk, calyx, and corolla, it is more like *Philesia* than *Lapageria*; but in the stamens, it approximates to the mother plant, and diverges from the characters of the male. In colour it is also more like the mother plant than it is like *Philesia*." This, like its allies, requires a peat soil, and a moist, cool house; it is, however, so shy a flowerer as to be worthless for decorative purposes.

P. Veitchii (Veitch's). *fl.* solitary, pendulous; calyx of three pale rose-purple, boat-shaped, fleshy sepals; petals three, bright rose-coloured, slightly unequal, overlapping, broadly ovate, acute; stamens six, the filaments pink-spotted; pedicels axillary, bracteate. *l.* alternate, petiolate, oblong, acute, about 1½in. long, leathery, smooth, dark shining green above, finely serrulated; petioles about ½in. long. Gardens, 1872. (G. C. 1872, 119.)

PHILESIA (from *phileo*, to love; alluding to the beauty of the flowers). ORD. *Liliaceæ*. A monotypic genus. The species is a glabrous, much-branched, greenhouse shrub. It thrives best in peaty soil, but grows slowly. In sheltered positions in Ireland, and in South-western England, it succeeds in the open air. Suckers are thrown up, by which the plant may be increased.

P. buxifolia (Box-leaved).* *fl.* red, showy, but smaller than those of *Lapageria* (to which this shrub is allied), solitary or very few at the tips of the branches, very shortly pedicellate; outer perianth segments erect, inner ones twice or thrice as long, somewhat spreading above; stamens six. June. *l.* alternate, very shortly petiolate, oblong, coriaceous, one-nerved, very slenderly reticulate-venulose; margins revolute. *h.* 4ft. Chili, &c., 1850. (B. M. 4738.)

PHILESIACEÆ. Included under *Liliaceæ*.

PHILIBERTIA (named in honour of J. C. Philibert, author of some works on elementary botany). SYN. *Sarcostemma* (in part). ORD. *Asclepiadeæ*. This genus comprises about thirty species of stove, twining shrubs or sub-shrubs, natives of tropical and sub-tropical America. Flowers usually greenish-white, or purple-veined inside; calyx small, five-parted; corolla often depresso-globose in bud, very broadly campanulate or sub-rotate when expanded, with five contorted, narrow lobes; cymes umbelliform. Leaves opposite. Few of the species are known to cultivation. Those described below are well adapted for training up rafters, pillars, or trellis-work, in stoves or conservatories. A compost of loam, peat, and sand is desirable. Cuttings will root readily, if inserted in sand, or in the above-named soil, under a glass, in slight heat.

P. campanulata (bell-shaped). *fl.* greenish-yellow, purplish-marked within, large, campanulate, pubescent outside; peduncles many-flowered, shorter than the leaves. October. *l.* ovate-oblong, acuminate, deeply cordate at base, tomentose beneath. *h.* 6ft. Peru. Greenhouse climbing shrub. (B. R. 1846, 36, under name of *Sarcostemma campanulatum*.)

P. gracilis (slender).* *fl.*, corolla yellowish outside, red-striped inside, three times as long as the calyx. *l.* deeply cordate, acuminate, sub-tomentose. Buenos Ayres. Greenhouse sub-shrub. (S. B. F. G. ser. ii. 403.)

P. grandiflora (large-flowered). *fl.*, corolla puberulous without, elegantly purple-striped within, with obtuse lobes; peduncles many-flowered. June. *l.* cordate, acute, pubescent above, incano-tomentose beneath, petiolate. Buenos Ayres, 1836. Plant pubescent. Greenhouse sub-shrubby climber. (B. M. 3618; B. R. 1843, 13.)

PHILLYREA (from *Philyra*, the old Greek name used by Theophrastus for the Privet). Jasmine Box; Mock Privet. ORD. *Oleaceæ*. A genus comprising only four species of ornamental, hardy, evergreen, glabrous or rarely cano-pubescent shrubs, natives of the Mediterranean region and the Orient. Flowers small, fasciculate in the axils; calyx and corolla four-lobed, those of the latter imbricated and obtuse. Drupe globose or ovoid,

Phillyrea—*continued.*

one or two-seeded. Leaves opposite, entire or serrulated. Several so-called species are merely varieties. Phillyreas thrive in almost any soil; but in the northern parts of this country they must have very sheltered positions. *P. Vilmoriniana* is the hardiest. Like the rest, it may be propagated from cuttings, or be grafted on the Privet.

P. angustifolia (narrow-leaved). *fl.* white. May. *l.* linear-lanceolate, quite entire, obsoletely veined. Branches beset with elevated dots. *h.* 8ft. to 10ft. Italy and Spain, 1597. The following are forms of this species: *brachiata*, with very short, oblong-lanceolate leaves, and divaricate branches; *lanceolata*, with lanceolate leaves and erect branches; and *rosmarinifolia*, with elongated, lanceolate-subulate leaves, and straight branches.

P. latifolia (broad-leaved). *fl.* white. May. *l.* ovate, rounded at the base, serrated, veiny; young ones sub-cordate at the base. *h.* 20ft. to 30ft. South Europe, 1597. (S. F. G. 2.) Of this, the following are forms: *lævis*, with ovate, flat, obsoletely-serrated leaves; *obliqua*, with lanceolate-oblong, acute, serrated, oblique leaves. *buxifolia*, *crispa*, *ilicifolia*, and *macrophylla*, are varieties with sufficiently distinctive names.

P. media (intermediate).* *fl.* white. May. *l.* lanceolate, quite entire, or a little serrated in the middle, triplinerved, veiny. *h.* 10ft. to 15ft. South Europe, 1597. The following are varieties: *pendula*, with lanceolate leaves, and divaricating, pendulous branches; *virgata* (SYNS. *ligustrifolia* and *oleæfolia*), with oblong-lanceolate leaves.

P. Vilmoriniana (Vilmorin's).* *fl.* whitish, numerous, in axillary clusters. *l.* resembling those of the Portugal Laurel. This plant is known in gardens under the name of *P. laurifolia*. Asia Minor, 1885. (B. M. 6800.)

PHILODENDRON (from *phileo*, to love, and *dendron*, a tree; referring to the arborescent nature of some species). ORD. *Aroideæ* (*Araceæ*). A genus comprising about 120 species of stove, climbing shrubs and small trees, rarely stemless herbs, natives of tropical America. Flowers spathaceous; spathe white, red, or yellow, thick, wholly persistent, the tube convolute, at length opening; spadix almost equalling, or shorter than, the spathe, sessile or shortly stipitate, dense-flowered, the females shorter than the males; peduncles terminal and axillary, usually short, generally fascicled. Leaves sheathed, opposite, coriaceous, oblong, ovate, cordate, or sagittate-hastate, entire, lobed, pinnatifid, or once or twice pinnatisect. Philodendrons are easily grown in a house where a high temperature and a moist atmosphere are maintained. They appear to the best advantage when trained to cover a back wall or a pillar. For this purpose, in a large house, they may be planted out at the base of the wall or pillar, or they may be grown in pots. An open compost of loam and peat, or leaf mould, to which some coarse sand should be added, is best; the plants are not, however, very fastidious regarding soil. Plenty of water and frequent syringings are essential in the summer or growing season; and no more shade should be applied than is requisite to keep the leaves from scorching. Propagated easily by dividing the stems into lengths consisting of about three joints, and inserting them in pots, in a brisk heat. They soon become established, and make new growth at the top. Any old plants which get too high for the house they occupy may have their tops cut off and inserted as large cuttings. These soon re-establish themselves. The best-known species are described below.

P. bipinnatifidum (bipinnatifid). *fl.*, spathe reddish-brown outside, greenish inside; spadix whitish. *l.* about 2ft. long and 1½ft. broad, bright green, bipinnatifid. Brazil. An ornamental, short-stemmed species, requiring only a cool stove or intermediate house.

P. brevilaminatum (short-bladed). *fl.*, tube of spathe oblong-ovoid, blood-colour on both sides, the limb pale green outside, yellowish-white within; spadix white, shorter than the spathe, stipitate. *l.* as long as the petioles; young ones cordate-ovate, very shortly rotundate; adult ones sub-triangular, the posterior lobes broadly rotundate, the anterior one broadly triangular, Bahia, 1860. Climber.

P. calophyllum (beautiful-leaved). *fl.*, spathe creamy outside, crimson within; spadix white. Brazil, 1872. A very handsome, short-stemmed plant, the foliage of which resembles that of *Cochliostema Jacobianum*. (I. H. n. s. 76.)

P. cannæfolium (Canna-leaved). *fl.*, spathe greenish. *l.* ovate-lanceolate, deep shining green, about 1ft. long; petioles very

Philodendron—*continued.*

stout, 1ft. long. Brazil, 1831. A desirable, short-stemmed perennial, particularly suitable for sub-tropical gardening.

P. Carderi (Carder's). A synonym of *P. verrucosum.*

P. crassinervium (thick-nerved).* *fl.*, spathe pale yellow-green, spotted with red, bright red within at the base, cucullate, contracted in the middle; spadix as long as the spathe, cylindrical. May. *l.* 1ft. to 2ft. long, broadly lanceolate, margined with red, the costa exceedingly thick and inflated; petioles 3in. to 4in. long, purplish-green. Stem running to a considerable length. A singular climber. (B. M. 3621; B. R. 1958.)

P. daguense (River Dagua). A synonym of *P. verrucosum.*

P. erubescens (blushing).* *fl.*, spathe blackish-purple outside, scarlet within, large, boat-shaped, contracted above the middle; spadix white or cream-colour, as long as the spathe, stout, obtuse. *l.* distant, alternate, large, between cordate and sagittate, coppery beneath, glossy, 1ft. or more long, on terete pedicels of about the same length, with purple sheaths at the base. Stem stout, climbing, rooting at almost every joint. A handsome species. (B. M. 5071.)

P. fragrantissimum (highly fragrant).* *fl.* powerfully and durably fragrant; spathe delicate cream-colour, with the swollen base red, nearly 9in. long, convolute and somewhat cucullate; spadix acute, nearly as long as the spathe, broadest at base. January. *l.* 1½ft. to 2ft. long, oblong-cordate, acute, inclining to sagittate, deeply two-lobed at base; petioles 2ft. or more long, quite flat above. Stem elongated, rooting. Demerara. (B. M. 3314, under name of *Caladium fragrantissimum.*)

P. giganteum (gigantic). *fl.*, tube of spathe oblong, purplish outside; spadix white, thick, sessile; peduncle very short and thick. *l.* broadly cordate-ovate, with the posterior lobes broadly semi-ovate or obliquely semi-orbiculate; petiole thick, slightly terete, twice as long as the costa. 1857. Climber.

P. Glaziovii (Glaziou's). *fl.* solitary, axillary; spathe pale yellowish, crimson on the inside of the tube. *l.* oblong, acute, deep green, 1ft. to 1½ft. long, 3in. to 5in. broad. Brazil, 1885. An ornamental climber, resembling *P. crassinervium.* (B. M. 6813.)

P. gloriosum (glorious). *l.* large, cordate-ovate, acute, deep rich green, the midrib and secondary nerves snow-white, the margins bordered with a thin edging of a pink colour; the young ones, on opening, have a silky reflection. Stem climbing. Columbia, 1877. A magnificent foliage plant. (I. H. n. s. 262.)

P. grandifolium (large-leaved).* *fl.* from a fissure at the base of the petiole; spathe at first pale green, afterwards pale buff, green at base on the outside, pinkish within, marked at the back with a purple hue, cucullate at the extremity; spadix green below, white above, as long as the spathe, slightly club-shaped, bursting two or three together. April. *l.* 2ft. or more long, cordate-sagittate, opaque above; petioles rounded, spotted with purple. Stem climbing, dingy-green, spotted with purple. Demerara. (B. M. 3345, under name of *Caladium grandifolium.*)

P. Holtonianum (Holton's). *fl.*, tube of spathe oblong; spadix very shortly stipitate, slender, cylindrical. *l.* ornamental, three-parted almost to the base, about 1½ft. long and rather less in width; middle lobe acute, one-nerved; lateral lobes obtuse, three-nerved; all shining green above, paler beneath. Columbia, 1876. Dwarf, almost stemless, herb. The correct name of this plant is *Anthurium insigne.*

P. laciniatum (jagged). *fl.*, tube of spathe greenish without, reddish-purple within, the blade dirty-white; spadix sessile; peduncles three or four in the same axil. *l.* membranous, tripartite, less than half as long as the slightly terete petioles. Stem rather thick, climbing. Brazil, 1824. SYN. *Caladium pedatum* (H. E. F. 206).

P. Lindeni (Linden's). A garden synonym of *P. verrucosum.*

P. longilaminatum (long-bladed). *fl.*, females twice as short as the males; spathe shorter than, and peduncle about as long as, the petiole. *l.* green above, slightly glaucous below, with the apex long-acuminate; petioles thick, semi-terete, sulcate. Stem

Philodendron—*continued.*

elongated, somewhat climbing; internodes elongated. Bahia, 1860.

FIG. 108. PHILODENDRON MAMEI.

P. Mamei (Mons. Mame's).* *l.* large, cordate, acute, handsomely marked with whitish variegations. Ecuador, 1883. A fine-leaved, stemless herb. See Fig. 108. (R. H. 1883, 492.)

P. melanochrysum (golden-black).* *l.* dull, dark green in colour, covered with a shining varnish, as though washed over with gold, appearing very brilliant in the sunshine. Columbia, 1874. A lovely species, of moderate growth and climbing habit. (I. H. n. s. 149.)

P. Melinoni (Melinon's). *fl.*, spathe cylindrical, rufescent outside, yellow within; spadix cylindrical, shorter than the spathe. *l.* long-stalked, ovate, oblong, acuminate, sagittate-hastate at base. Stem, short, thick, shaggy. Guiana, 1874. (R. G. 789.)

P. pertusum (perforated). A synonym of *Monstera deliciosa.*

P. pinnatifidum rubro-punctatum (pinnatifid, red-dotted).* *fl.* crowded; spathe white, sprinkled with blood-red, almost sessile, the same length as the spadix, the tube narrowly ovoid, the blade boat-shaped; spadix pale dirty-yellow, about 9in. long. May. *l.* 2ft. long, broadly sagittate-ovate, glossy, pinnatifid halfway to the middle, with regular, upcurved lobes; petioles 2½ft. to 3ft. long, swollen at base. Stem none, or short and thick, clothed with brown sheaths. South Brazil, 1868. (B. M. 5948, under name of *P. rubro-punctatum.*)

P. recurvifolium (recurved-leaved). *fl.*, spathe green without, the tube scarlet within, ellipsoid. *l.* all on petioles, which are shorter than the blade, green, margined with purple, somewhat oblong-cordate-sagittate. Bahia, 1860. Climber. The whole plant, especially the leaves, is irregularly spotted with blood-colour.

P. rubens (reddish). *fl.*, spathe 6in. to 8in. long, whitish-green without, purplish-red within, on a short peduncle; spadix white, cylindrical, slightly shorter than the spathe; inflorescence sessile. *l.* cordate-ovate, acuminate, the length of the petioles. Stem robust, somewhat erect, rather densely leafy. Venezuela, 1873. Climber. (B. M. 6021.)

P. sanguineum (bloody).* *fl.*, spathe green, convolute above the middle; spadix shortly stipitate, cylindrical; peduncles half as long as the spathe. *l.* rather thick, green above, often purplish beneath, elongated, cordate-oblong, trilobed; petioles shorter than, or about equalling, the leaves. Mexico, 1869. Climber. (R. G. 621.)

P. Selloum (Sello's).* *fl.*, spathe deep green, bordered with white outside, whitish within, large, conical, terminating in a sort of hood. *l.* large, long-stalked, oval-oblong, deep green, forming a broad head, bipinnatifid, with the two basal lobes themselves pinnatifid. Stem stout, emitting thick, flexible roots. A beautiful (arborescent when old) perennial. See Fig. 109. (B. M. 6773; R. H. 1869, 252, under name of *P. Sellowianum.*)

P. serpens (serpent). *fl.*, spathe pinkish and yellowish outside, cream and crimson inside, 5in. long; spadix cream-coloured. *l.* oblong-cordate, 1ft. to 1½ft. long. Stem scandent, rooting at the nodes, leafy at the summit, clothed between the leaves with dense masses of fibry scales. New Grenada, 1877. A handsome species. (B M. 6375.)

Philodendron—*continued.*

P. Simsii (Sims').* *fl.*, spathe crimson, and inflated at base, contracted in the middle, and expanded in the upper part into a white, oval hood, about 8in. long, rather exceeding the spadix, nearly sessile. March. *l.* cordate-sagittate, above 2ft. long and 1½ft. across, with large, raised, purple veins beneath; petioles rounded, 1½ft. long. Stem stout, erect. Caraccas and Guiana, about 1825. (B. M. 2643, under name of *Caladium grandifolium.*)

FIG. 109. PHILODENDRON SELLOUM.

P. Sodiroi (Sodiro's). *l.* elongated cordate-ovate, with a very obtuse sinus, short auricles, and a long-pointed apex, soft and twisted, bright green, with large, interrupted, silvery spots; nerves prominent and violaceous beneath; petioles depressed above, violaceous, dotted with white. Tropical America, 1884. An ornamental climber.

FIG. 110. PHILODENDRON SPECIOSUM.

P. speciosum (showy). *fl.*, spathe thick, purplish-green outside, carmine within. *l.* triangular, oblong-ovate, deeply sagittate, light green. Stem tall, arborescent (when mature). South Brazil. See Fig. 110.

P. verrucosum (warted).* *l.* cordate, of a delicate satiny-green, shaded with metallic olive-colour on the upper surface, the under part pale green, ornamented with bands of maroon; the young ones are of a bright chamois-colour, and the maroon bands of the under parts penetrate through to the upper. Ecuador, 1866. One of the most brilliant species grown. See Fig. 111. SYNS. *P. Carderi*, *P. daguense* (I. H. n. s. 79), *P. Lindeni* (of gardens, in part).

P. Williamsii (Williams').* *fl.*, spathes green, yellowish within, thick, obtuse, apiculate, 1ft. long, surrounding a stout, cylindric, cream-coloured spadix. *l.* long-stalked, sagittate-acute, 1ft. to 2½ft. in length. Trunk thick, erect, rooting. Bahia, 1871. A noble plant. (B. M. 5899.)

PHILOGYNE. Included under *Narcissus.*

PHILOTHECA (from *philos*, smooth, and *theke*, a sheath; alluding to the smooth tubes of the stamens). ORD. *Rutaceæ.* A genus comprising only a couple of species of ornamental, erect, Heath-like shrubs, confined to extra tropical and Eastern sub-tropical Australia. Flowers terminal, nearly sessile, solitary or two or three together; calyx segments and petals five, the latter imbricate in bud; disk slightly lobed. Leaves crowded, alternate, narrow-linear. *P. australis*, the only species introduced, requires culture similar to **Phebalium** (which *see*).

P. australis (Southern).* *fl.* pale red, usually solitary, but sometimes two or three together; sepals broadly triangular; petals broadly lanceolate. April. *l.* numerous, linear, obtuse, rarely exceeding ¼in. long, rather thick, flat or channelled above, very convex underneath, or almost terete. *h.* 2ft. 1822.

PHILYDRACEÆ. A very small natural order of erect, terrestrial herbs, natives of Australia, the Malayan Archipelago, Eastern Asia, and the Pacific Islands. Flowers inclosed in spathaceous bracts, solitary, disposed simply at the sides of a rachis, or in a branched panicle, hermaphrodite, irregular; perianth free to the ovary, and having four segments in two series; stamen one, opposite the posticous perianth segment; filament complanate, often shortly connate at the base with the interior segments. Capsule ovoid or oblong, three-valved, many-seeded. Leaves linear or ensiform, radical or clustered at the base of the stem, often distichous; cauline ones few, smaller. The order contains but four species, and these are split up into three genera: *Helmholtzia*, *Philydrum*, and *Pritzelia.*

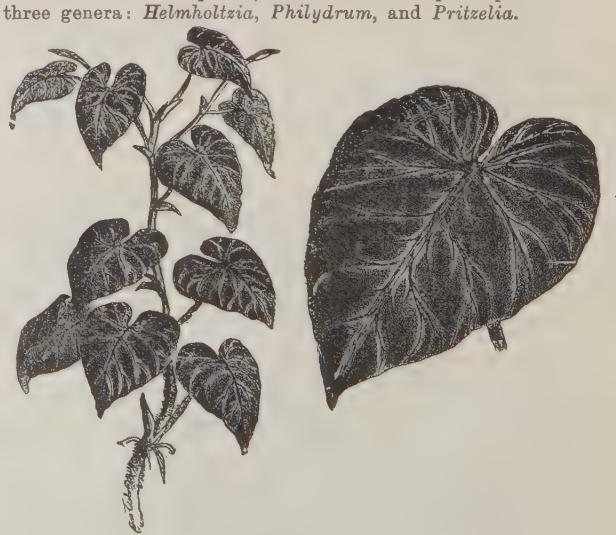


FIG. 111. BRANCH AND DETACHED LEAF OF PHILODENDRON VERRUCOSUM.

PHILYDRUM (from *phileo*, to love, and *hydor*, water). SYN. *Garciana.* ORD. *Philydraceæ.* A monotypic genus, the species being a greenhouse biennial, rather more interesting than ornamental. It requires a sandy

Philydrum—*continued.*

loam and peat compost. Seeds should be sown in a gentle heat.

P. glaberrimum (very glabrous). A synonym of *Helmholtzia glaberrima.*

P. lanuginosum (woolly). *fl.* yellow, solitary or twin, on long, simple, interrupted spikes, protected by sheathing bracts; perianth segments four, the outer ones much shorter than the inner ones. June. *l.* lanceolate, divided at the base, covered with dense, woolly hairs, spongy within. Stem erect, slightly branched. *h.* 2ft. to 3ft. Tropical Asia, Australia, &c., 1801. (B. M. 783.)

PHINÆA (an anagram of *Niphæa*, to which this genus is closely allied). ORD. *Gesneraceæ.* A genus comprising three or four species of dwarf, erect, villous, stove herbs, with the habit of *Niphæa* (under which they have until recently been included), natives of Columbia. Flowers white or pale lilac; calyx turbinate-campanulate, the tube adnate to the ovary, the lobes five, obtuse; corolla tube very short, the limb shortly and broadly five-lobed; pedicels twin or fasciculate in the axils, rather long. Leaves opposite, petiolate, soft. For culture, *see* **Achimenes.**

P. albo-lineata (white-lined).* *fl.* white, borne on axillary, umbellate peduncles. September. *l.* opposite, long-stalked, ovate-acute, crenate-serrated, often purplish beneath. *h.* 9in. New Grenada, 1844. (B. M. 4282, and F. d. S. 210, under name of *Niphæa albo-lineata.*)

P. a.-l. reticulata (netted). This variety differs from the type only in the discoloured nerves of the leaves being reticulated. (B. M. 5043 and F. d. S. 8, 823, under name of *Niphæa albo-lineata reticulata.*)

P. rubida (reddish).* *fl.* white, very numerous, fasciculate, very long-stalked. July. *l.* clustered, ovate, sub-cordate-auriculate at base, toothed. Branchlets very short. *h.* 6in. Guatemala, 1846. Whole plant reddish velvety-villous. (F. d. S. iii. 251, under name of *Niphæa rubida.*)

PHLEBIGONIUM. Included under *Nephrodium.*

PHLEBIOPHYLLUM. Included under **Trichomanes** (which *see*).

PHLEBODIUM. Included under **Polypodium** (which *see*).

PHLEUM (from *Phleos*, an old Greek plant name used by Theophrastus). SYN. *Stelephuros.* ORD. *Gramineæ.* A genus comprising about half-a-score species of hardy, annual or perennial, erect grasses, natives of Europe, Central and North Asia, North Africa, and North and Antarctic America. Panicle rather long, pedunculate, always densely spike-formed, sometimes elongated, narrow-cylindrical, sometimes shorter, oblong or scarcely ovoid, often pubescent; spikelets one-flowered, with rarely a rudimentary second flower; glumes three; stamens three. *P. alpinum*, *P. arenarium*, *P. phalaroides* (*P. Boehmeri*), and *P. pratense* (Cat's Tail, or Timothy Grass), are natives of Britain. The species have no horticultural value.

PHLOGACANTHUS (from *phlox*, *phlogos*, flame, and *Acanthus*; from the flame-coloured flowers of some species). SYN. *Loxanthus.* ORD. *Acanthaceæ.* This genus contains about twelve species of tall, stove shrubs or herbs, inhabiting the Himalayan Mountains and Martaban. Flowers whitish, reddish, or greenish, cymose; cymes disposed in long, thyrsoid, terminal spikes, or axillary and shorter; corolla tube large, incurved. Leaves entire, or slightly toothed, often large. For culture, *see* **Justicia.**

P. asperulus (slightly rough).* *fl.*, corolla purplish-red, somewhat funnel-shaped; tube short, rather gibbous at base; spike terminal, on a quadrangular peduncle. January. *l.* large, opposite, remote, broadly ovate-lanceolate, obscurely serrate, entire at base, petiolate. *h.* 3ft. Khasia Mountains, Assam, &c. Shrub. (B. M. 2845 and B. R. 1340, under name of *Justicia quadrangularis*; L. B. C. 1681, under name of *Justicia asperula.*)

P. curviflorus (curved-flowered).* *fl.* yellowish, with an elongated corolla. November. *l.* large, elliptic, acute at both ends, toothed, glabrous. Stems quadrangular, downy. *h.* 3ft. to 6ft. Khasia Mountains, 1839. Shrub. (B. M. 3783.)

P. guttatus (spotted-flowered). *fl.* yellow, spotted, fascicled; racemes terminal. Spring. *l.* oblong, attenuated at both ends, sub-crenulated. *h.* 2ft. India, 1828. Herb. (B. R. 1334.)

PHLOMIS (the old Greek name used by Dioscorides). ORD. *Labiatæ.* A genus of tomentose, woolly, canescent, or greenish, mostly hardy herbs, sub-shrubs, or shrubs, inhabiting temperate and mountainous Asia and the Mediterranean region. Upwards of seventy plants have been described as species, but, probably, not more than fifty are sufficiently distinct to merit specific rank. Flowers yellow, purple, or white; corolla with an inclosed or scarcely exserted tube, the upper lip compressed, entire or notched, tomentose or villous, sessile, and the lower three-cleft and spreading; whorls many-flowered, axillary; bracteoles often numerous, ovate, lanceolate, or narrow, appressed. Nutlets ovoid-triquetrous. Leaves wrinkled; floral ones conformed, or the uppermost ones diminutive. All the species are of easy culture in ordinary garden soil; they are well adapted for naturalising in shrubberies, wild banks, and borders. All may be increased by seeds; the shrubby sorts also by cuttings, and the herbaceous kinds by division. The under-mentioned species are those best known to cultivation, and are, except where otherwise indicated, hardy perennial herbs.

P. armeniaca (Armenian). *fl.*, corolla yellow, similar to that of *P. lychnitis*; whorls six-flowered; bracts mucronulate. June and July. *l.* obscurely crenated; radical ones oblong; petioles cordate-oblong, obtuse; cauline ones lanceolate, attenuated at base. *h.* 6in. to 12in. Armenia, 1834. Plant floccose-woolly. (S. B. F. G. ser. ii. 364.)

P. cashmeriana (Cashmere).* *fl.* pale lilac; corolla larger than in *P. pungens* (to which species this is allied); bracts subulate, ciliated, longer than the calyx. July. *l.* ovate-lanceolate, obtuse, crenated towards the apex, broadly rounded at base, pubescent or villous above, white-tomentose beneath. Stem densely floccose-tomentose. *h.* 2ft. Cashmere. (B. R. 1844, 22.)

P. ferruginea (rusty).* *fl.* yellow, densely tomentose outside; whorls twelve to twenty-flowered. June. *l.* oblong-lanceolate, obtuse, crenulated, cordate at the base, much wrinkled and green above, but tomentose beneath. Branches clothed with rusty-purple, loose wool. *h.* 2ft. to 3ft. Italy, Crete, &c., 1823. Hardy shrub.

P. floccosa (floccose). *fl.*, corolla yellow, the size of that of *P. Samia*; whorls few, distant, large, twenty to thirty-flowered. July to October. *l.* ovate-oblong, much wrinkled, cordate at base, greenish above, and clothed with floccose wool beneath. Branches also floccose-woolly. *h.* 2ft. Egypt, 1828. Half-hardy sub-shrub. (B. R. 1300.)

P. fruticosa (shrubby).* Jerusalem Sage. *fl.* yellow or dusky-yellow, very showy; whorls solitary or twin at the tops of the branches, twenty to thirty-flowered. June. *l.* ovate or oblong, roundly cuneated at the base, wrinkled, green above, and clothed with white tomentum beneath. Branches clothed with tomentum, which is usually yellow. *h.* 2ft. to 4ft. Mediterranean region, 1596. Hardy shrub. (B. M. 1843; S. F. G. 563.)

P. herba-venti (wind-herb).* *fl.* purplish-violet, tomentose outside; whorls ten to twenty-flowered. July to September. *l.* oblong-lanceolate, crenated, rounded at the base, coriaceous, green on both surfaces, or canescent beneath. Branches beset with long hairs. *h.* 1ft. to 1½ft. Mediterranean region, &c., 1596. An erect, divaricately much-branched species. (B. M. 2449; S. B. F. G. ser. ii. 74; S. F. G. 564.)

P. lychnitis (link). Lamp-wick. *fl.*, corolla yellow, twice as long as the calyx. June to August. *l.* sessile, oblong-linear, narrowed at both ends, stem-clasping; cauline ones 2in. to 3in. long, scarcely ⅓in. broad, green or canescent above, white-tomentose beneath; floral ones very broad at base. *h.* 2ft. South Europe, 1658. Plant suffruticose, hoary-tomentose. (B. M. 999.)

P. pungens (pungent). *fl.*, corolla purplish-violet; whorls six to ten-flowered; bracts subulate, ciliated. July. *l.* on short petioles, ovate-lanceolate, quite entire or serrated, rounded at base, shining green above, and rather scabrous, clothed with hoary tomentum beneath. Branches also hoary-tomentose, divaricating. *h.* 1½ft. to 2ft. South-eastern Europe, 1820. (S. B. F. G. 33.)

P. Samia (Samos). *fl.* greenish cream-colour on the outside, and thickly set with hairs, pinkish inside; lower lip also pinkish inside, with numerous, darker-coloured veins or streaks; whorls axillary and terminal, ten to fifteen-flowered; bracts numerous, linear, very acute. Early summer. *l.* ovate-cordate, acute, crenated, wrinkled, green above, clothed with grey tomentum beneath, on hairy stalks. Stems herbaceous, tall, pubescent. *h.* 2ft. to 3ft. North Africa, &c., 1714. (A. B. R. 584; B. M. 1891; S. F. G. 564.)

P. tuberosa (tuberous). *fl.* purplish-rose, densely hairy, very numerously disposed in dense whorls; upper lip very hairy, and margined with a delicate white fringe; lower lip perfectly smooth. June. *l.* ample ovate, obtuse, crenated, deeply cordate at the

Phlomis—*continued.*

base; floral ones oblong-lanceolate. Stem herbaceous, purplish. Roots tuberous. *h.* 3ft. to 5ft. East of Europe to Siberia, 1759. (B. M. 1555.)

P. viscosa (clammy). *fl.* yellow, tomentose outside; whorls large, from forty to fifty-flowered; bracts linear, very acute. June. *l.*, radical ones very ample, ovate, deeply cordate at the base, all wrinkled, green above, and tomentose beneath. Branches tall, almost simple, tomentose. *h.* 3ft. to 5ft. Syria, 1821. (B. M. 2542, under name of *P. lunarifolia Russelliana.*)

PHLOX (from *phlox*, flame; alluding to the general brilliancy of the flowers). ORD. *Polemoniaceæ.* A genus comprising twenty-seven species of hardy, erect or diffuse, tall or tufted, perennial, or rarely half-hardy annual herbs, natives of North America and Russian Asia. Flowers red, violet, or white, usually showy, sometimes solitary, sessile or stalked, sometimes cymose, the cymes disposed in terminal, corymbose or thyrsoid panicles; calyx tubular-campanulate, with five acute or acuminate lobes; corolla salver-shaped, with equal obovoid, orbiculate, or obcordate lobes. Leaves entire; cauline ones opposite, or the uppermost ones alternate.

The perennial species and varieties of *Phlox* may fairly be designated some of the best and most popular of garden plants. They are all very easily cultivated, and a selection from the genus is practically within the reach of everybody. Some of the species are dwarf, creeping plants, well adapted for the rockery, or front line of a mixed border. Where they can be obtained in sufficient quantity, they are sometimes employed with success for spring bedding. *P. subulata* and its varieties are the best known of the dwarf, creeping kinds; they may, therefore, be referred to as examples. None of these dwarf species seed freely; they are propagated chiefly by means of cuttings or divisions. Cuttings should be inserted in a cold frame about July, and kept shaded from bright sunshine. They will form good plants by the following spring, when they may be placed in permanent quarters outside for flowering. Large plants may be easily converted into numerous small ones by shaking some light soil amongst them in summer, and then dividing in autumn, when the trailing branches will be found to have rooted. Any well-drained ordinary soil will suit, but a sunny exposure is most desirable. Dwarf tufted species of *Phlox* are rarely injured by frost; but it is not unusual for large patches to die away in winter when the weather is very mild and damp.

Other distinct groups or sections which are much more generally cultivated than those already referred to, are the early or summer-flowering, and the autumn or late-flowering, tall-growing varieties. These are highly attractive, and, as they succeed each other in flowering, it is a good arrangement to plant some of both alternately. They may be propagated from seed; by cuttings of the young stems, shoots, or roots; and by division. Seeds preserved with a view to raising new varieties should only be gathered from extra good plants. They should be sown, when collected, in pans filled with sandy loam, and be kept in a warm greenhouse or pit until spring, when the young plants will appear. These should be grown on, and eventually hardened, to plant out in April or May, if strong enough. Many will flower the first season, but not so strongly as in the second. Oftentimes, the seeds germinate irregularly, especially if they are kept long before being sown. Cuttings root very readily at almost any season, in a little warmth; they may be procured at the end of March, in large quantities, from the base of old plants. For increasing new or scarce varieties, cuttings may be made of pieces of root. These may be cut into short lengths and treated somewhat like seeds. Propagating by division simply consists in lifting the plants in early spring, cutting them at the base into small pieces, and replanting. These tall-growing perennials succeed best in rather heavy soil, and where it is of a good depth; they will, however, thrive fairly well in any good border or bed. A thick top-dressing of manure, in summer, is of great help, both by preventing evaporation and affording nutriment. If the weather is dry, a heavy drenching of water occasionally is also recommended, as it tends to considerably prolong the flowering season. The plants are very attractive in beds by themselves, or in mixed borders along with other perennials. They are also well adapted for culture in pots, if provided with a rich soil, and grown in a cool, slightly-shaded frame, through the summer.

Phlox—*continued.*

P. Drummondii is one of the most beautiful and useful half-hardy annuals in cultivation. It may readily be raised from seeds, which should be sown in a little heat, during March, in pans, boxes, or on a partially-spent hotbed. As soon as the seedlings become large enough to handle, they should be pricked off in other boxes, and grown on in frames until May, when they may be gradually inured to the open air. When about 3in. high, the points should be pinched out, with a view to inducing a more compact habit. This species, and its varieties, in numerous colours, are fine for planting in flower-garden beds, amongst other tall-growing subjects that, maybe, are partially naked near the bottom. The plants require a rich soil and plenty of water; like the others, a mulching of manure, in summer, is of great help. Seedlings may also be grown, in pots, for greenhouse decoration; and cuttings may readily be struck for a similar purpose. They will thrive in any ordinary frame after the middle of April.

The most important species, from a garden standpoint, are described below. They are perennials, except where otherwise stated.

FIG. 112. INFLORESCENCE OF PHLOX DRUMMONDII.

P. amœna (pleasing).* *fl.* purple or pink, seldom white, disposed in a compact corymb; corolla lobes obovate, entire, rarely emarginate. June. *l.* slightly erect, oblong, lanceolate, or linear-lanceolate, slightly acute or obtuse. Stem ascendent, simple, 6in. to 15in. high. Virginia to Florida, 1809. Plant softly hairy or villous. SYN. *P. pilosa amœna.* (B. M. 1308.)

P. aristata (awned), of Michaux. A form of *P. subulata.*

P. canadensis (Canadian). A synonym of *P. divaricata.*

P. candida (white). A form of *P. maculata.*

P. carnea (flesh-colour). A form of *P. glaberrima suffruticosa.*

Phlox—*continued.*

P. Carolina (Carolina). A form of *P. ovata.*

P. cordata (heart-shaped). A synonym of *P. paniculata.*

P. corymbosa (corymbose). A synonym of *P. paniculata.*

P. crassifolia (thick-leaved). A synonym of *P. reptans.*

P. decussata. *See* **P. maculata.**

P. divaricata (spreading).* *fl.* pale lilac or bluish, in forked corymbs, the lobes of the corolla obcordate or cuneate, notched at the end, or sometimes entire, equalling or longer than the tube. Spring and early summer. *l.* oval-lanceolate, superior ones alternate. *h.* 9in. to 16in. North America, 1746. (B. M. 163.) SYN. *P. canadensis* (S. B. F. G. 221).

P. Drummondii (Drummond's).* *fl.* red, varying to rose, purple, or white, with a darker eye, on very short pedicels; panicle trichotomously corymbose. August. *l.* ovate-lanceolate, half stem-clasping, all mucronate and downy, lower ones opposite, upper ones alternate. Stems erect, simple at bottom, but a little branched at top, beset with spreading hairs. *h.* 1ft. Texas, &c., 1835. A lovely half-hardy annual. See Fig. 112. (B. M. 3441; B. R. 1949; S. B. F. G. ser. ii. 316.)

FIG. 113. INFLORESCENCE OF PHLOX PANICULATA.

P. frondosa (leafy). A synonym of *P. subulata frondosa.*

P. glaberrima (very glabrous).* *fl.* red, disposed in a corymbose, few-flowered panicle; calyx teeth very acute. July. *l.* lanceolate or linear-lanceolate, the uppermost ones narrowly ovate-lanceolate, firm in texture, almost veinless, bright green and glossy above, often with revolute margins. Stem slender, erect, 1ft. to 2ft. high. Ohio to Florida, 1725. (S. B. F. G. ser. ii. 36.)

P. g. suffruticosa (sub-shrubby).* *fl.* rose, disposed in a clustered, few-flowered, corymbose panicle; lobes of corolla ovate, entire. April. *l.*, upper ones broadly lanceolate, somewhat rigid, slightly pilose or glabrous. Stem more rigid than those of the type, smooth or scabrous, 2ft. high. South United States, 1834. (B. M. 1344 and S. B. F. G. 190, under name of *P. Carolina.*) SYN. *P. suffruticosa* (B. R. 68). *P. carnea* (B. M. 2155) is a smooth form.

P. linearifolia (linear-leaved). *fl.* flesh-colour, corymbose; corolla tube slightly exceeding the calyx, the lobes obovate-cuneate, entire, rarely retuse. July. *l.* very narrow-linear, lin. to 2in. long. Stem suffruticose at base, erect or adsurgent, slightly rigid. *h.* 9in. to 12in. Columbia River, &c., 1826. (B. R. 1351, under name of *P. speciosa.*)

P. longiflora (long-flowered). A synonym of *P. maculata candida.*

P. maculata (spotted).* *fl.* purple in the type, disposed in oblong-thyrsoid or sub-pyramidal panicles; corolla tube more or less incurved, the segments orbiculate, obtuse or retuse. July. *l.*, lower ones lanceolate, uppermost ones ovate, cordate at base, rather thick, glabrous or slightly scabrous. Stem erect, almost simple. *h.* 2ft. Pennsylvania, Iowa, and Florida, 1740. This species is very near *P. paniculata*, differing in its narrower oblong panicle and scarcely-pointed calyx lobes. The stems are dwarfer, and spotted with purple, and the flowers sweet-scented. The normal tint of the flowers is purple, but they vary in colour. Then there is the form with a more pyramidal inflorescence, called *P. pyramidalis* (S. B. F. G. 233). The garden varieties of this and *P. paniculata*, generally referred to in nursery catalogues under the name of *P. decussata*, are so blended and intermixed that it is now impossible to refer them to their respective species. Moreover, the typical plants are almost unknown out of botanical collections. Other forms are: *P. odorata* (S. B. F. G. 224), *P. penduliflora* (S. B. F. G. ser. ii. 46), *P. reflexa* (S. B. F. G. 232). *P. candida* is a white-flowered form, generally with a spotless stem. SYNS. *P. longiflora* (S. B. F. G. ser. ii. 31), *P. suaveolens.*

FIG. 114. PHLOX REPTANS.

P. Nelsoni (Nelson's). A form of *P. subulata.*

P. nivalis (snowy). A form of *P. subulata.*

P. ovata (ovate-leaved).* *fl.* reddish-purple, in small, terminal, crowded cymes, with undulated, retuse petals. Spring. *l.*, radical ones ovate, acute, rather fleshy; cauline ones ovate-oblong. *h.* 1ft. to 1½ft. North America, 1759. Plant erect, glabrous or nearly so, never viscid. (B. M. 528.) SYN. *P. triflora* (S. B. F. G. 293). *P. Carolina* is a taller form, with narrower, more tapering leaves, and pointed calyx teeth, approaching *P. glaberrima.* (B. M. 1344.)

P. paniculata (panicled).* *fl.* pink-purple, varying to white, in large, terminal, pyramidal-corymbose panicles; the segments of the corolla roundish; calyx teeth subulate setaceous. August. *l.* oblong-lanceolate and ovate-lanceolate, tapering at the base, or the uppermost more or less cordate. Plan erect, smooth, rough, or hairy. *h.* 3ft. to 4ft. United States, 1732. See Fig. 115. SYNS. *P. cordata* (S. B. F. G. ser. ii. 13), *P. corymbosa* (S. B. F. G. ser. ii. 114), *P. scabra* (S. B. F. G. 248).

P. p. acuminata (acuminate). A variety with the stems and under side of the leaves hairy; the latter are also broader and more pointed. (B. M. 1880.)

P. pilosa (pilose).* *fl.* pink, purple, rose, or sometimes white, in nearly sessile fascicles; corolla lobes ovate, entire. May. *l.* linear or lanceolate, short, villous, pilose or pubescent, sometimes

Phlox—*continued.*

glabrous. Stem erect, slender, 1ft. to 2ft. high. Carolina, 1759. A very elegant species. (B. M. 1307; L. B. C. 1251.)

P. p. amœna (pleasing). A synonym of *P. amœna.*

P. procumbens (procumbent). *fl.* lilac, with violet marks near the eye, disposed in terminal, few-flowered panicles, composed of one or two-flowered peduncles. Summer. *l.* lanceolate, acute, attenuated at the base, smoothish, ciliated on the edges. Stems procumbent, branched; branches downy. North America, 1827. This is regarded by Asa Gray as a hybrid between *P. amœna* and *P. subulata*; it is unknown as a wild plant. (L. B. C. 1722; S. B. F. G. ser. ii. 7.)

P. reptans (creeping).* *fl.* purple or violet, in few-flowered corymbs; tube of corolla 1in. long, limb about 1in. broad. Spring. *l.*, radical ones obovately-spathulate; cauline ones lanceolate. Alleghany region, 1800. Plant creeping, stoloniferous, downy. A neat and dwarf-growing species, with showy flowers. See Fig. 114. SYNS. *P. crassifolia* (L. B. C. 1596), *P. stolonifera* (B. M. 563; S. B. F. G. ser. ii. 293).

P. scabra (scabrous). A synonym of *P. paniculata.*

P. setacea (bristly-leaved). A synonym of *P. subulata.*

P. stolonifera (stolon-bearing). A synonym of *P. reptans.*

P. suaveolens (sweet-smelling). A synonym of *P. maculata candida.*

FIG. 115. FLOWERING BRANCH OF PHLOX SUBULATA.

P. subulata (subulate-leaved).* Ground or Moss Pink. *fl.* pinkish, with a darker centre, disposed in few-flowered corymbs; lobes of corolla wedge-shaped, notched. April. *l.* from ¼in. to ½in. long, awl-shaped, linear, pungent, ciliated. South New York to Florida, &c., 1786. See Fig. 115. (B. M. 411.) SYN. *P. setacea* (B. M. 415). Of this elegant and profuse-flowering, densely-tufted species, there are white forms in cultivation,

FIG. 116. FLOWERING BRANCHES OF PHLOX SUBULATA NIVALIS.

under the names of *P. aristata* (L. B. C. 1731), *P. Nelsoni*, and *P. nivalis* (see Fig. 116) (L. B. C. 780; S. B. F. G. 185).

P. s. frondosa (leafy). A very vigorous variety, with lilac-rose flowers. See Fig. 117. SYN. *P. frondosa.*

Phlox—*continued.*

P. suffruticosa (sub-shrubby). A synonym of *P. glaberrima suffruticosa.*

P. triflora (three-flowered). A synonym of *P. ovata.*

Varieties. These are very numerous, and are annually increased in number by the selection and naming of seedlings for distribution as improved forms in one or another particular. In gardens, they are generally divided into two sections, early-flowering and late-flowering, which are termed respectively *Suffruticosa* and *Decussata.* The latter have been chiefly obtained from *P. maculata* and *P. paniculata*; the other from *P. glaberrima suffruticosa.* Many of the varieties have flowers of the purest white, others vary much in colour; and almost all are exceedingly beautiful and effective. Varieties of *P. Drummondii* come true from seed, but it is not usual to keep them separately named, except for seed-production; they are generally mixed together before being sown. The following is a selection from the two sections to which reference has been made.

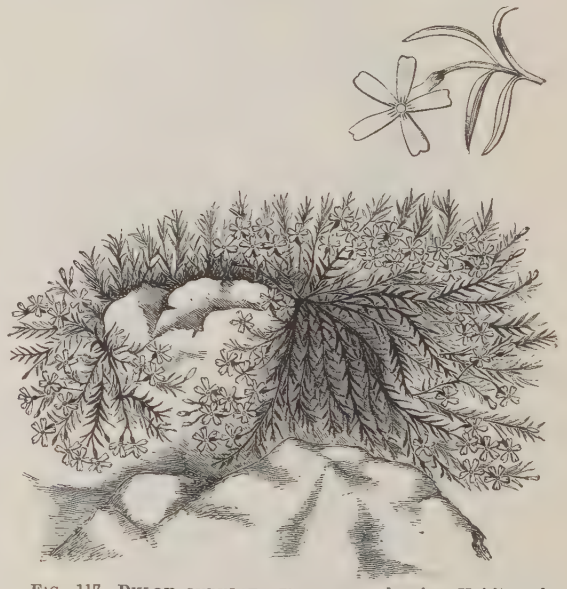


FIG. 117. PHLOX SUBULATA FRONDOSA, showing Habit and detached Flower and Leaves.

Early-flowering Varieties (*Suffruticosa* Section). ALLAN M'LEAN, rosy-purple; of finest form and quality. ANNIE LOCKHART, white, pink eye; large and fine. BEAUTY, white, rose eye; compact. BEAUTY OF EDINBURGH, pure white, with violet eye. BRIDESMAID, waxy-white; inflorescence large and compact. COUNTESS OF GALLOWAY, pure white, highly fragrant; finest form. DR. ROBERT BLACK, red, of finest quality; extra. DUCHESS OF ATHOLE, pure white, rosy-crimson eye; large and fine. GEORGE EYLES, rosy-purple; of fine form. HERCULES, rosy-purple; extra large flower. IDA, white, small rose eye; fine. LADY NAPIER, pure white, highly fragrant one of the best. LINNET, white, mottled rosy-lilac; distinct and good. MAGGIE LAUDER, white, violet eye. MALCOLM M'INTYRE, rosy-purple, dark eye. MISS ROBERTSON, pure white, dwarf; extra fine. MRS. CALDER, delicate white, with lilac eye; good dwarf habit. MRS. FORBES, white, shaded rose; fine form. MRS. GELLATLY, pure white, large eye. MRS. GREENSHIELDS, white, purple eye; fine. MRS. HUNTER, pure white, large bright crimson eye. MRS. JAMES ROBERTSON, pure white, rich violet eye; extra fine. MRS. P. GUTHRIE, white, dark lilac eye. MRS. RITCHIE, rose-purple. PAULINE, clear white, deep rosy-crimson eye; a fine variety. PEARL, pure white; good form, highly fragrant. PRESIDENT, rich red, brilliant. PRIMA DONNA, pure white; compact. REDBRAES, white, crimson eye. SOCRATES, white, dark purple eye. THE DEACON, deep rosy-purple. THE SHAH, rosy-purple, very large; one of the finest. VAN HOUTTE, rose, distinctly striped white; free. VENUS, beautiful mauve; fine form. WM. KIRKPATRICK, rose-purple, large deep rose eye; extra fine.

Late-flowering Varieties (*Decussata* Section). A. BORROWMAN, mauve; distinct. AYTON CASTLE, vermilion, large; extra.

Phlox—*continued.*

COCCINEA, rich vermilion; extra fine. COUNTESS OF ROSSLYN, snowy-white, rose eye. DAVID SYME, pure white, fine magenta eye. FLAMBEAU, dazzling amaranth, large flower; first-rate. GAVIN GREENSHIELDS, crimson, effective. GENERAL GORDON, light rosy-peach; very fine. GEORGE COUPAR, rich crimson self; fine form. GEORGE GOODFELLOW, deep rosy-crimson, with bright crimson eye; very large. GRAHAM MCCULLOCH, rich vermilion. HENRY CANNELL, mauve, rose centre; large and well formed. JAMES ALEXANDER, rich crimson self. JAMES COCKER, pure white, scarlet eye; fine. JAMES GRIEVE, crimson self, very bright, large flower and inflorescence. JANE WELSH, white, crimson eye; fine. JOHN FORBES, pink, dark crimson eye; large and good. JOHN HAMPTON, amaranth, large dense inflorescence. LOTHAIR, salmon-scarlet, dwarf; extra fine. MALCOLM DUNN, bright crimson, magenta eye; compact. MATTHEW MILLER, rich crimson self; dwarf. MRS. KEYNES, pure white; large and well formed, of great substance. MRS. LAING, soft rosy-lilac; dwarf, compact habit. MRS. SANDERSON, mauve, rose centre, large floret and inflorescence; extra. MRS. T. SPEEDY, white, shaded rose; distinct. OVID, white, shaded purple; large. PURPLE PRINCE, dark purple, maroon eye; very distinct. ROBERT LAIDLAW, crimson self; large and fine. SERAPH, white, red eye, neat flower; fine inflorescence. THE QUEEN, beautiful white, large; dwarf habit. THOMAS BOYD, rose-amaranth; fine form and substance. THOMAS CHISHOLM, pure white; dwarf, fine. TOM WELSH, bright red, compact, novel shade; first-rate. TRIOMPHE DU PARC DE NEUILLY, brilliant red; fine form. T. S. WARE, lilac, bluish centre; very distinct. VESUVIUS, bright crimson-scarlet, dark crimson eye. WHITE LADY, pure white; very fine and distinct. WM. VEITCH, white, shaded rose, dark crimson eye; one of the best.

FIG. 118. PHŒNIX DACTYLIFERA.

PHŒNICEUS. Deep red, with an admixture of scarlet or carmine.

PHŒNICOPHORIUM SECHELLARUM. A synonym of **Stevensonia grandifolia** (which *see*).

FIG. 119. PHŒNIX RECLINATA.

PHŒNIX (the old Greek name of the tree, used by Theophrastus). Date Palm. SYNS. *Elate*, *Fulchironia*, *Phoniphora*. ORD. *Palmæ*. A genus comprising about a dozen species of stove or greenhouse palms, natives of tropical and sub-tropical Asia and Africa. Flowers yellow, mediocre; spikes growing out from amongst the leaves, and bearing flowers of one sex only, the two sexes being upon different trees. Both kinds have a cup-shaped, three-toothed calyx, and a corolla of three petals, with their edges valvate in the male, and overlapping in the female; the former containing usually six (very rarely three or nine) stamens, with hardly any filaments, and narrow, erect anthers, and the latter three distinct ovaries, with sessile, hooked stigmas. Only one of the ovaries, however, comes to perfection, and ripens into a one-seeded, fleshy fruit, the seed being composed of horny albumen, with a groove down the front, and the embryo placed at the back. Leaves terminal, spreading and recurved, unequally pinnate; segments somewhat fascicled or almost equidistant, elongate-lanceolate or ensiform, acuminate, with entire margins. Trunks, when present, usually rising to a great height, and covered thickly with the scars of fallen leaves.

The species are readily raised from imported seeds, sown in a sandy soil, in a mild hotbed. After the seedlings have attained a sufficient size, pot off singly into small pots, using the same kind of soil in which the seeds were sown. For later shifts, good turfy loam will be better. In the South of France, many of the species are largely grown in the open air, to supply the demand in Paris, &c., for well-grown specimens for the decoration of apartments. The method pursued is this: the plants

Phœnix—*continued.*

are taken up, the soil shaken from the roots, packed in bundles, and forwarded to Paris, where each one is firmly placed in as small a pot as possible; they are then

FIG. 120. PHŒNIX RUPICOLA.

plunged in a mild hotbed in a warm house, which is kept shaded and syringed until new roots have formed, when shading is gradually removed, and the plants hardened off. By these means, much better specimens are more rapidly and cheaply obtained than would be possible under a system of pot-culture from the seedling stage onwards.

Phœnix—*continued.*

P. acaulis (stemless).* *l.* pinnate, 1ft. to 3ft. or more long, spreading; pinnæ dark green, narrow, swollen at the base, the lower ones reduced to broad, flat spines. Stem very low, or entirely wanting. *h.* about 12ft. Central India, 1816. An ornamental, low palm, with a short, thick stem, like a bulb. It is valuable for decorative purposes.

P. dactylifera (date-bearing). Common Date Palm. *fl.*, male panicles white, compact, 6in. to 9in. long, on a short peduncle, the flowers sweet-scented; female spikes 1ft. to 2ft. long. *fr.* generally reddish or yellowish-brown when ripe, oblong, 1in. to 3in. long; pulp fleshy, sweet. *l.* grey, longer than those of *P. sylvestris*; pinnæ 8in. to 16in. long, regularly distichous, often approximate in twos or threes on the same side of petiole, which is grey, laterally compressed, almost flat. Trunk covered with the persistent bases of petioles, the foot often surrounded by a dense mass of root suckers. *h.* 100ft. to 120ft. (in this country, rarely over 30ft.). India, Levant, 1597. A handsome, erect-growing palm, the fruit of which is well known in this country as an article of luxury. In its native regions, nearly every part of this plant is applied to some useful purpose. See Fig. 118.

P. farinifera (mealy). *l.* pinnate, 3ft. to 4ft. long; pinnæ ovate-acuminate, about 6in. long, terminating in a sharp mucrone, the lower ones reduced to spines. *h.* about 7ft. East Indies, 1800. An elegant, compact-growing species.

P. leonensis (Sierra Leone). A synonym of *P. spinosa*.

P. Ouseleyana (Ouseley's). *fl.*, male spadices about 1ft., females 2ft. to 2½ft. long. *l.* 2½ft. to 3ft. long; pinnules entirely conduplicate, about 1ft. long, from the conduplication, about ⅛in. broad, subulate-acuminate; lowermost ones degenerated into short spines. Bulbous stems ovate, about 1ft. long and 6in. in diameter. India.

P. paludosa (marsh-loving). *fl.*, males yellow, spadix about 1ft. long; females greenish, spadix 1½ft. long. *l.* gracefully spreading, 8ft. to 10ft. long; pinnules bifarious, solitary, spreading, then curved downwards, not rigid, 2ft. long, eight lines wide, exceedingly acuminate, the lowest longest and narrowest; petioles covered with brownish, glaucescent scurf. Trunk 12ft. to 15ft. high, 3½in. in diameter, annulate at base, otherwise covered with brown, armed petioles. India.

FIG. 121. PHŒNIX SYLVESTRIS.

P. reclinata (leaning).* *l.* pinnate; pinnæ linear, somewhat triangular and spreading. Stem becoming stout with age.

Phœnix—*continued.*

h. about 50ft. South-east Africa, 1792. A fine and large-growing species. See Fig. 119.

P. rupicola (rock-loving).* *l.* pinnate, arching, spreading, having a slender rachis and very short petiole, which is dilated at the base, and partially encircles the growing point; pinnæ long, narrow, about 6in. in length, finely arched, the lower ones reduced to spines. *h.* 15ft. to 20ft. India, 1873. The handsomest species in the genus. See Fig. 120.

P. spinosa (spiny). *fl.*, male peduncles 4in. to 8in. long. *fr.* about ½in. long, ovate-cylindrical, brownish. *l.*, pinnæ linear-lanceolate, acuminate, pungent-pointed, unequidistant, aggregated or scattered, ten to twelve lines wide at their broadest part. Trunk 6ft. to 10ft., or rarely 30ft. in height, soboliferous. Western tropical Africa. SYN. *P. leonensis.*

P. sylvestris (sylvan).* East Indian Wine Palm; Wild Date. *fl.* similar to those of *P. dactylifera.* *fr.* green at first, reddish-yellow when ripe, 1in. long. *l.* greyish-green, 7ft. to 12ft. long; pinnæ very numerous, 6in. to 18in. long, alternate and opposite, not fascicled; petiole compressed in the leaf-bearing part, brown at base. *h.* 40ft. India, 1763. One of the hardiest. See Fig. 121.

FIG. 122. PHŒNIX TENUIS.

P. tenuis (narrow).* A recent, but very elegant, addition to the genus; it resembles *P. dactylifera* in general appearance, but is more slender and finer in all its parts. Habitat unknown. See Fig. 122.

PHOLIDOCARPUS (from *pholis, pholidos*, a scale, and *karpos*, fruit; the fruit is covered with a scaly coat). ORD. *Palmæ.* A genus, of doubtful affinity, of two species of stove palms, natives of the Malayan Archipelago. *P. Ihur*, the only species in cultivation, thrives in a compost of turfy loam and leaf mould.

P. Ihur (Ihur). Spadix loosely branched. Drupe ovoid, three or four-seeded, as large as a medium-sized hen's egg, with a rugose, tesselated rind. *l.* like those of *Borassus flabellijormis*; petioles armed with robust spines.

PHOLIDOPHYLLUM. A synonym of *Cryptanthus.*

PHOLIDOTA (from *pholis*, a scale, and *ous, otis*, an ear; alluding to the scaly, ear-like bracts of the spike). Rattlesnake Orchid. SYNS. *Chelonanthera* (in part), *Crinonia, Ptilocnema.* ORD. *Orchideæ.* A genus consisting of about a score species of stove orchids, with creeping, branched stems or rhizomes, or with one or two-leaved pseudo-bulbs; they are natives of India and the Malayan Archipelago, extending as far as Southern China. Flowers small, shortly pedicellate, in terminal racemes; sepals carinate-concave, erect or spreading; petals usually smaller, slender, flat; lip sessile at the base of the column, concave and sub-baccate at base, three-lobed; column sometimes very short; bracts ovate, imbricated, and persistent, or narrower and deciduous. The species are of no particular horticultural value. Those given below require culture similar to **Cœlogyne** (which *see*).

P. clypeata (shield-flowered). *fl.* resembling those of *P. imbricata*, but arranged in a spike not more than 3in. long; column resembling a three-lobed petal, bordered with brown, imparting to

Pholidota—*continued.*

the flower the appearance of having two lips. Pseudo-bulbs about 2in. long, each with a dark green leaf. *h.* 6in. Borneo, 1847.

P. imbricata (imbricated). *fl.* yellowish, with a dash of violet, freely produced on pendulous spikes as long as the leaves; lateral sepals ovate, carinate; lip sub-globose, cucullate, with the intermediate lobe bilobed; bracts concave, pointed. *l.* solitary, oblong-lanceolate, plicate, acute. Pseudo-bulbs oblong, corrugate-sulcate, obtuse. *h.* 1ft. East Indies, 1824. (B. R. 1777; H. E. F. 138; L. B. C. 1934.)

P. pallida (pale). *fl.* white, smaller than in *P. imbricata*; bracts very round, blunt. *l.* also smaller. *h.* 6in. India, 1828. (B. R. 1215.)

PHOMA. *See* **Sphaeropsideæ.**

PHONIPHORA. A synonym of **Phœnix** (which *see*).

PHORMIUM (from *phormos*, a basket; referring to the uses made of the fibre). Flax Lily, or New Zealand Flax. SYN. *Chlamydia.* ORD. *Liliaceæ.* A small genus (two species) of nearly or quite hardy, rigid herbs, with fleshy, fibrous roots, natives of New Zealand. Flowers dull red or yellow, large, panicled, erect, jointed on the pedicel; perianth tubular, curved, of six leaflets, the inner with spreading tips; stamens six, exserted; scapes leafless, variable in height, from 5ft. to 15ft., branched and bracteate. Leaves radical, linear-ensiform, distichous, coriaceous, very tough. The species and varieties are of easy culture in rich, loamy soil. They are well adapted for greenhouse decoration, for use as sub-tropical plants in summer, and, in the southern parts of the country, are sufficiently hardy to grow, uninjured, outside; they are however, more safe, if protected, in frosty weather, with some covering. In a greenhouse, the long, erect, sword-like leaves of New Zealand Flax are very distinct, when the plants are associated with others. Large specimens, in pots or tubs, have a very fine appearance in conservatories, or when placed, during summer, in prominent positions in the flower garden. Propagated, in spring, by division of the crowns before growth commences; also by seeds.

P. Colensoi (Colenso's). A synonym of *P. Cookianum.*

FIG. 123. PHORMIUM COOKIANUM, showing Habit and Portion of detached Inflorescence.

P. Cookianum (Cook's).* Small Flax Lily. *fl.* yellow, or with the outer segments greenish, 1in. to 1½in. long; inner segments acuminate, reflexed; scapes 3ft. to 6ft. high. Summer. *l.* 2ft. to 3ft. long, more acuminate than in *P. tenax* (than which this species is smaller in all its parts), rarely split at the top. 1868. SYNS. *P. Colensoi, P. Forsterianum.* See Fig. 123.

P. C. variegatum (variegated).* *l.* narrowish, erect, pointed, lanceolate, coriaceous, dark green, elegantly banded at the margin with one, or sometimes two, narrow stripes of creamy-

Phormium—*continued.*

white. * A beautiful, variegated-leaved plant, altogether smaller and more elegant than *P. tenax*. (R. H. 1878, 56.

P. Forsterianum (Forster's). A synonym of *P. Cookianum*.

FIG. 124. PHORMIUM TENAX, showing Habit and detached Flower.

P. tenax (tough).* Common New Zealand Flax. *fl.* yellow or red, but variable, 2in. long. August. *l.* from 3ft. to 6ft. or more in length, rigid, erect, dark green, with a narrow, reddish-brown margin, and always split at the tip when old. 1798. The hardier of the two species. See Fig. 124. (B. M. 3199.) The following are some of the best forms:

P. t. atro-purpureum (dark purple). *l.* wholly of a beautiful purple, suffused with a reddish tinge. A handsome form, differing from the type only in the colour of its leaves.

P. t. nigro-pictum (black-spotted). *l.* deep green, about 2ft. long and 1½in. wide, narrowly edged with blackish-purple, the edge becoming broader and more distinct on the base, where it forms a conspicuous, zigzag line, elegantly spread out as the plants become mature. A compact-growing form, much dwarfer in habit than the type, and smaller also in the foliage.

P. t. variegatum (variegated).* *l.* dark green, striped with rich yellow and white, often 6ft. in length. New Zealand. A very pretty, striped form of the common species.

P. t. Veitchianum (Veitch's). A fine form, with shorter and narrower leaves, which are of a bright pea-green, and have broad stripes of a creamy-white, extending the entire length of each leaf.

PHORODON HUMULI. This insect, known also as the Hop Aphis, is frequently most destructive to the Hop-plants, where these are cultivated on a large scale; but in gardens it does little harm, though occasionally hurtful to Hops grown for ornamental purposes. It belongs to the green group of Aphides, and the genus differs very little from the other Green Flies in appear-

Phorodon Humuli—*continued.*

ance. Many efforts have been made to combat this pest in the Hop-gardens. One remedy is to wash the plants thoroughly, with the help of a garden engine, with a solution of 3lb. or 4lb. of soft soap in 200 gallons of water, adding a little infusion of coarse tobacco to the solution if thought fit; another is furnished by a newly-discovered emulsion of petroleum, which is said to be very effective. In gardens, it is only necessary to look occasionally to the young shoots, and to crush the Aphides before they become numerous.

What is regarded by most entomologists as a variety of this insect (*P. Humuli*, var. *Mahaleb*) occurs in gardens on leaves of Plums, and also lives on Sloes. Among the most useful assistants in reducing the ravages of these, as well as of other Aphides, are the larvæ of Ladybirds (*Coccinella septempunctata*, &c.), of Golden-eyed Flies (*Chrysopa*); and of Hawk-flies (*Syrphus*).

PHOSPHATES OF LIME. Chemical substances which contain the elements calcium and phosphorus, both of which are found to be present in all plants. The ash which remains when the plants are burned invariably contains them in greater or less amount. Experiments on plants which are supplied with food of definite and strictly-ascertained composition, have proved that when either of these elements is withheld, the plants remain small and stunted, though the other elements required in the food are all supplied. On adding the missing element to the food, growth begins, and goes on in a healthy way. But, though this has been ascertained, there is still much uncertainty as to the way in which each of these elements exerts its beneficial action on plants. It is believed that calcium is of use both in enabling plants to obtain the sulphur and phosphorus that they require more readily in combination with it (in sulphate of lime and Phosphates of Lime) than these elements could be otherwise supplied to them, and in combining with oxalic acid, which is largely formed in growing tissues of plants, but is hurtful to them in excess. The calcium unites with this to form oxalate of lime, in the shape of small crystals, called "raphides," which are very common in the cells of many plants—in some resembling bundles of minute needles; in others, in the form of cubes; in others, like balls, studded over with sharp points. Oxalate of lime is harmless to plants. Phosphorus is believed to be of value chiefly in helping to form protoplasm, and to transfer it from place to place, as needed for growth in the plants. Phosphates are employed chiefly to supply phosphorus, and they are drawn from the soil by the plants as they require it. There are several Phosphates that contain calcium. They differ from one another in the percentage of calcium that they contain, and also in their solubility; but, for a discussion of their composition and preparation, the reader

Phosphates of Lime—*continued.*

is referred to works on chemistry, such as Miller's "Elements of Chemistry," or Johnston and Cameron's "Elements of Agricultural Chemistry and Geology." Soils generally contain a small quantity of the Phosphates of Lime, but not enough for the requirements of cultivated plants, as each crop removes some of the small supply, which, in time, becomes exhausted. Hence, it is necessary to add to the soil new supplies of Phosphates; and this is largely done by means of artificial manures. The chief sources of Phosphates are bones and coprolites, which latter are hard, grey or brown, rounded pebbles, abundant in certain localities in England. They were formerly believed to be the fossilised dung of animals (from the Greek word *kopros*, dung). They are probably the fragments of bones of great reptiles that lived in the period to which the rocks and strata (Greensand) in which they are found belong. There are also other less important sources of the mineral. The Phosphate contained in bones and in coprolites is not soluble in pure water, but is so in acetic acid and in the stronger acids. Experiments show that various substances insoluble in water are rendered soluble by contact with the roots of plants, probably by means of the excretion of an acid from them. Bone Phosphate is acted on in this way, and the effect is largely increased when the bones or minerals are in a finely-powdered state. Bone-dust, prepared by grinding bones, after they have been steamed, to remove the animal matter, and thus render them more easy to reduce to powder, and ground coprolites and mineral Phosphates, are now largely used as manures. In this form, the Phosphates have the advantage of remaining in the soil for a considerable time, until absorbed by the roots of plants; hence, their action is spread over more than one year. It is, however, frequently desired to allow plants to absorb them more rapidly than can be done where the roots have to render the Phosphates soluble. To permit of this, the Soluble Phosphate, or Superphosphate of Lime is made use of. It is prepared by subjecting bones, or a mixture of bone-ash and mineral Phosphates, to the action of sulphuric acid (oil of vitriol), in the proportion of about three parts of the Phosphates to two of acid. The commercial Superphosphate is a somewhat indefinite substance, composed of the soluble Phosphate of Lime in large proportion, along with small quantities of the insoluble Phosphates and a good deal of sulphate of lime. The soluble Phosphate readily dissolves in water, and plants obtain it in larger proportion the first season after it is put on the soil; but it is liable to be washed out of the soil by rain: hence, its effects are not lasting. It should be mixed with two or three times its bulk of ashes or mould before sprinkling it on the soil. It is asserted by Mr. Jamieson, as the result of his experiments, that Superphosphate of Lime favours the development of "Finger-and-Toe" (the work of *Plasmodiophora Brassicæ*) in Turnips; but this is denied by others, who advocate its use.

PHOSPHORUS (from the Greek words *phos*, light, and *phoreo*, I bear; in allusion to its being luminous in the dark). One of the chemical elements found in all living beings. It always occurs, in nature, combined with several other elements, and cannot remain in its usual form exposed to the air without undergoing change, since it unites with one of the gases (oxygen) that make up the air. A well-known, nearly inert modification of Phosphorus in the air is that made use of to tip the ends of lucifer matches.

Phosphorus—*continued.*

There is still much uncertainty regarding the use or uses of Phosphorus in plants, but it is believed that it aids in building up the protoplasm, or actual living substance, of the bodies of both plants and animals, as well as in the transference of the protoplasmic substances from the cells in which they are formed to the parts in which they are to be employed, in supplying food to old tissues, or in forming new cells. The combinations in which plants obtain the supply of Phosphorus necessary for them are almost wholly the phosphates of lime; of which several exist, differing among themselves in the percentage they contain of the aliment calcium (which is the base in lime), and in their solubility in water. *See* **Phosphates of Lime.**

PHOTINIA (from *photeinos*, shining; in reference to the leaves). Including *Eriobotrya*. ORD. *Rosaceæ*. A genus comprising about a score species of half-hardy, evergreen shrubs or trees, natives of the mountains of India, China, and California. Flowers frequently white, disposed in terminal corymbs or panicles; calyx with a campanulate or turbinate tube and five ovate, obtuse lobes; petals five, spreading; stamens about twenty. Drupe or berry ovoid, in some species edible, one to five-celled, the cells one or two-seeded. Leaves alternate, short or long-stalked, coriaceous, simple, entire or serrate; stipules sometimes almost leaf-like. Photinias are very handsome-leaved shrubs for sheltered situations, and for culture against walls. In cold parts of the country, and during severe weather, some protection is essential. They prefer a rather light, loamy soil, and do not succeed well if it is very stiff. Propagated by cuttings of side shoots, 2in. or 3in. long, inserted in sandy soil, under a bell glass; also, in the open air, in April, by cleft-grafting, close to the ground, on stocks of common Quince. These may be procured from cuttings or layers. *P. japonica* is most commonly seen in cultivation.

FIG. 125. FRUITING BRANCHLET OF PHOTINIA JAPONICA (much reduced).

P. arbutifolia (Arbutus-leaved). Californian Maybush. *fl.* white, disposed in an elongated panicle; petioles and young branches

Photinia—*continued.*

bright red. July. *l.* oblong-lanceolate, acute, distinctly serrated. *h.* 10ft. to 20ft. California, 1796. Tree. SYN. *Cratægus arbutifolia.* (B. R. 491.)

P. elliptica (elliptic). *fl.* white; thyrse compound, terminal, clothed with fulvous tomentum. *fr.* yellow, downy. *l.* flat, elliptic, toothed, tomentose beneath. *h.* 30ft. Nepaul, 1823. Tree.

P. japonica (Japanese).* Japan Medlar; Japan Quince; Loquat. *fl.* white, in pendulous racemes. Autumn. *fr.* about the size of a small apple, pale orange-red, downy, in large bunches. *l.* large, oblong, rugose, downy beneath. *h.* 10ft. to 20ft. Japan, 1787. A handsome shrub or tree, producing edible fruit when grown under cover. It is sufficiently hardy to withstand the cold of an ordinary English winter, but an unusually severe frost is fatal to it. From the late period of its flowering, the fruits are scarcely ever produced here in the open air, although, in the South of France, considerable quantities are annually secured. This species, like its congeners, is peculiarly well adapted for wall culture as an ornamental, flowering shrub. See Figs. 125 and 126. (B. R. 365.)

FIG. 126. PHOTINIA JAPONICA, showing Inflorescence and Single Fruit.

P. serrulata (toothed).* Chinese Hawthorn. *fl.* white, small, in terminal, flat corymbs. April to July. *l.* large, Laurel-like, coriaceous, oblong, acute, serrulated. *h.* 10ft. to 20ft. Japan and China, 1804. A handsome shrub. SYN. *Cratægus glabra.* (B. M. 2105; L. B. C. 248.)

PHOTINOPTERIS. Included under *Acrostichum.*

PHRAGMIDIUM (from the Greek *phragmos*, a fence; in allusion to the partitions between the numerous cells in each spore). A small genus of Fungi, belonging to the group popularly known as Brands, or in science as *Uredineæ*. The species best known to gardeners are those that cause the Raspberry Brand (*P. Rubi-Idaei*, Pers., or *P. gracile*, Grev.) on wild and on garden Raspberries, and Rose Brand (*P. mucronatum*) on Rose-leaves. In all the species of *Phragmidium*, the Fungus appears on the green parts, especially on the leaves, in the form of small spots, usually very numerous, on the lower surface. The leaf is, in some plants (*e.g.*, Bramble), discoloured around the spots; in others (*e.g.*, Raspberry), it is not discoloured. The Fungus is, at first, yellow, and the spots are seen, with the aid of the microscope, to be made up of masses of globular, or angular, yellow cells or spores. In this stage, the species of *Phragmidium* used to be referred to the genus *Lecythea*. As the Fungus matures, the spots become dark brown or black, and the spores then present are much larger than those produced in the previous stage. Each consists of a single row of cells, from three to ten in number. They are very dark brown when mature, and are supported on slender footstalks. The species on Raspberry has eight to ten cells

Phragmidium—*continued.*

in the spore. The Fungus, as observed on the leaves, is reproducing the species, and the spots are masses of spores formed at certain places; but the more important part is the mycelium, which grows among, and feeds on, the tissues of the host-plant. The Brands of this genus are, as a rule, not very hurtful to cultivation, though both the above, viz., Rose Brand (*P. subcorticium*, Schr., or *P. mucronatum*, Fr., with six to eight-celled spores) on Roses, and *P. Rubi-Idaei* on Raspberry, are common. The only remedy is to remove and to destroy all the diseased leaves, by burning or by digging into the soil.

PHRATORA VITELLINÆ (the Willow-leaf Beetle). A small beetle, elliptical in form, but flattened, about $\frac{1}{12}$in. or $\frac{1}{8}$in. long by $\frac{1}{16}$in. broad, and deep blue or metallic green in colour. The wing-cases are marked lengthwise with rows of dots. The beetles and their larvæ feed on the leaves of Willows and of Poplars, gnawing the tissues of the leaf from below till only the network of veins is left, with the thin, transparent membrane of the upper surface stretched upon it. The larvæ are rather long in the body, with six true legs on the front part. The head is black, the body whitish or yellowish, with black marks on the back, and black spots on the sides. They become pupæ in the soil. There are usually two broods in a year, and the beetles of the second hybernate, protected under loose bark, or among rubbish on the ground near the plants. All sorts of Willows and Poplars are liable to injury from this insect.

Remedies. The larvæ may be shaken off the leaves, upon anything spread to receive them, and should be collected and destroyed. The mere shaking them off while immature is of use, as many fail to find their way back to the trees; but such a proceeding would do little harm to the mature larvæ, which are ready to burrow into the earth. In some parts of the country, the Willow-growers have their trees hand-picked or shaken over vessels containing a little paraffin. Others make use of Paris green, in suspension, in water, about $\frac{1}{2}$lb. to 1lb. being used in 40gals. of fluid; this must be sprinkled over the plants. The hybernating beetles should also be removed in the loose bark and surface rubbish, and all the rubbish in which they lie should be burned. In various parts of the country, the Osiers were threatened with destruction till Paris green was employed as a remedy.

PHRYMA (a Linnæan name of unknown meaning; said to be of American origin). Lopseed. SYN. *Leptostachya*. ORD. *Verbenaceæ*. A monotypic genus. The species is a hardy, herbaceous perennial, of no great horticultural merit. It thrives in almost any soil. Increased by division; or by seeds, sown in the open ground, in spring.

P. Leptostachya (Leptostachya). *fl.* purplish, inconspicuous, sessile, in much-elongated spikes, each in the axil of a setaceous bract, and subtended by a pair of minute bractlets, at length strictly reflexed. August. *l.* ovate, acuminate, coarsely serrated; ower ones on long petioles. *h.* 2ft. to 4ft. Central Asia, North America, &c., 1802.

FIG. 127. PHYGELIUS CAPENSIS.

PHRYNIUM (from *phrynos*, a toad; referring to the genus inhabiting marshes). SYN. *Phyllodes*. ORD. *Scitamineæ*. A genus containing nearly twenty species of stove, herbaceous perennials, natives of the East Indies, the Malayan Archipelago, and tropical Africa. Flowers in terminal heads or panicles; sepals three, narrow; corolla shorter, or scarcely longer, than the calyx; lip broad, transversely crested, cucullate, or sometimes two-lobed. Leaves sub-radical, on long stalks. Stems leafy. Roots creeping. Few of the species are grown in gardens. For culture, *see* **Calathea**, under which are included two or three species usually known as Phryniums.

Phrynium—*continued.*

P. coloratum (coloured). A synonym of *Calathea colorata*.

P. eximium (choice). A synonym of *Calathea eximia*.

P. maculatum (spotted). A garden synonym of *Dracæna phrynioides*.

P. sanguineum (bloody). *fl.* rich blood-colour; outer sepals free to the base, erect; inner ones combined for a good part of their length; scape 1ft. to 1½ft. long, erect, terminated by a compound raceme. Winter and spring. *l.* 10in. to 12in. long, oblong, acuminate, dark green above, rich purple below, on short petioles. Native place unknown. 1845. Plant stemless or caulescent. (B. M. 4646.)

PHUOPSIS (from *Phu*, and *opsis*, resemblance; alluding to the similarity in the plants). ORD. *Rubiaceæ*. A monotypic genus. The species is a hardy, slender herb, with a perennial root, and a slender, elongated stem. For culture, *see* **Crucianella.**

P. stylosa (large-styled).* *fl.* pink, hermaphrodite, capitate, involucrate, bracteate and bibracteolate; calyx with an obovoid tube and an obsolete limb; corolla tubular-funnel-shape, with five oblong-ovate, obtuse, valvate lobes. July. *l.* in whorls of six to eight, sessile, narrow-lanceolate, acuminate; margins spiny-ciliate. *h.* 1ft. Caucasus, 1836. (B. R. 1838, 55, under name of *Crucianella stylosa*.)

PHYCELLA. Included under *Hippeastrum*.

PHYGANTHUS. A synonym of **Tecophilæa** (which *see*).

PHYGELIUS (from *phyga*, flight, and *helios*, the sun; said to love shade). ORD. *Scrophularineæ*. A genus comprising only a couple of species of erect, very glabrous, South African shrubs. Flowers scarlet, showy, on recurved pedicels; calyx of five imbricated segments; corolla with an incurved or slightly erect, elongated tube, and a limb of five round, spreading lobes; peduncles loosely cymose, three to seven-flowered, disposed in a terminal, secund panicle. Leaves opposite, stalked, crenulate; floral ones reduced to bracts; the uppermost ones alternate. *P. capensis*, the only species introduced, thrives in a light, rich, loamy soil. Seeds, which are abundantly produced, should be sown in a slight hotbed, in spring, and the seedlings afterwards transplanted to a warm, sunny border. The species may also be increased by cuttings.

P. capensis (Cape).* Cape Figwort. *fl.* scarlet; corolla 1½in. long; tube constricted at base above the ovary, slightly enlarged above; peduncles opposite, or the upper ones alternate. Summer. *l.* ovate or ovate-lanceolate, 2in. to 3in. long. Branches rather thick, sub-tetragonal, smooth. *h.* 3ft. 1855. A showy plant. See Fig. 127. (B. M. 4881; F. d. S. 1111; R. G. 227.)

PHYLICA (from *phyllikos*, leafy; alluding to the abundant evergreen foliage). Including *Soulangia* and *Trichocephalus*. ORD. *Rhamneæ*. A genus comprising about sixty-five species of greenhouse, evergreen shrubs, rarely trees, often Heath-like, tomentose or pubescent; they are very numerous in extra-tropical and South Africa, and rare in Tristan d'Acunha and Madagascar. Flowers small, axillary, or in very densely crowded heads or spikes, shortly pedicellate, bracteate or ebracteate, very rarely loosely cymose; calyx with an obconical, urceolate, or cylindrical tube and five lobes; petals five, cucullate or setiform, or absent. Fruit pisiform, dead black. Leaves coriaceous, often small, alternate, thick, very rarely large, frequently white-tomentose beneath; margins entire, recurved or revolute. The species mentioned below are all South African shrubs. They thrive in sandy peat, and succeed best in a greenhouse temperature. Propagated by cuttings of half-ripened shoots, inserted in sandy soil, under a bell glass, in a warm greenhouse.

P. buxifolia (Box-leaved). *fl.* greenish, disposed in heads at the tips of the branches. May to September. *l.* ovate, spreading, smooth above, but covered with hoary down on the under surface. *h.* 6ft. 1759. SYN. *Soulangia buxifolia*. (L. B. C. 848.)

P. capitata (headed). *fl.* white, disposed in roundish heads about the size of a chestnut May to August. *l.* linear-lanceolate, somewhat villous; lower ones reflexed, smooth; floral ones very villous, spreading a little. *h.* 2ft. 1800. (B. R. 711.) SYNS. *P. plumosa* (L. B. C. 253), *P. pubescens* (of Aiton).

Phylica—*continued.*

P. ericoides (Heath-like). *fl.* pure white, disposed in hemispherical heads. April to September. *l.* linear-lanceolate, rather blunt, spreading, smooth, downy beneath. Branches somewhat umbellate. *h.* 3ft. 1731. (B. M. 224.)

P. plumosa (feathery). *fl.* whitish; bracts villous or feathery, forming a beautiful plume at the tips of the branches. Autumn. *l.* linear-lanceolate or lanceolate, awl-shaped, smooth above, hairy beneath, with revolute margins. *h.* 1ft. to 2ft.

P. p. squarrosa (squarrose).* *fl.* white, disposed in roundish heads; calyx segments erect, acute. August to November. *l.* linear-lanceolate, spreading, villous and hoary on the under surface; lower ones rather smooth; floral ones longer than the rest, spreading. *h.* 2ft. 1800. (L. B. C. 36.) SYN. *P. pubescens* (L. B. C. 695).

P. plumosa (feathery), of Loddiges. A synonym of *P. capitata.*

P. pubescens (downy), of Aiton. A synonym of *P. capitata.*

P. pubescens (downy), of Loddiges. A synonym of *P. plumosa squarrosa.*

P. rubra (red). *fl.* red, disposed in terminal heads. December. *l.* lanceolate, acute; under surface downy. *h.* 3ft. 1827. SYN. *Soulangia rubra.* (B. R. 1498.)

P. spicata (spike-flowered). *fl.*, perianth white, small, thick, and fleshy; spike about 2in. long. August. *l.* scattered, rather remote, all but the upper ones patent, or even reflexed, linear, somewhat acute, semi-cylindrical, the margins revolute; upper ones passing into bracts. A small, slender shrub.

P. stipularis (stipular). *fl.* white, disposed in terminal, sessile heads; bracts short, naked, usually bifid. May to September. *l.* alternate, lanceolate-linear, slightly acute, smooth above, hoary-velvety beneath, with revolute edges. *h.* 3ft. 1786. SYN. *Trichocephalus stipularis.*

PHYLLAGATHIS (from *phyllon*, a leaf, and *agatheos*, divine; referring to the beauty of the foliage). ORD. *Melastomaceæ.* A genus comprising only a couple of species of handsome, very thick, herbaceous, small stove shrubs, with short stems, restricted to the Malayan Peninsula and Islands. Flowers pink, in short, pedunculate, densely crowded heads; calyx tube oblong or turbinate-campanulate; lobes three or four, ovate, acute, as are also the four, rarely three, petals; bracts ample, involucrate. Leaves opposite, or solitary and terminal, large, petiolate, orbiculate, cordate at base, obtuse, entire or denticulate, seven to nine-nerved, shining above, discoloured beneath; petioles often hairy within. *P. rotundifolia* requires a very moist and warm atmosphere. It thrives best in a compost of peat and sand, to which may be added a little leaf mould. Propagated by leaf-cuttings, which should be kept in a close frame in the stove until well established.

P. gymnantha (naked-flowered). *fl.* pink, disposed in a compact head; petals obliquely bilobed; peduncles springing from the upper axils, tinged with red below. *l.* ovate, seven-nerved, cordate at base, bright glossy green, ciliated on the margins. Stem short, erect. Borneo, 1884.

P. rotundifolia (round-leaved). *fl.* pink, densely crowded in axillary, pedunculate heads, each of which is involucrated by bracts. July. *l.* opposite, large, roundish, 6in. to 9in. long, 4in. to 6in. wide; the upper surface plaited and shining, of a rich, deep, metallic green, slightly tinged with red; the under side dark red, with very prominent ribs. Stem square, stout. *h.* 1ft. to 2ft. Sumatra. The beauty of this species is confined to the leaves. (B. M. 5282.)

PHYLLAMPHORA. A synonym of **Nepenthes** (which *see*).

PHYLLANTHUS (from *phyllon*, a leaf, and *anthos*, a flower; because the flowers, in some species, are produced on the edges of the leaf-like branches). Including *Bradleia, Cicca, Kirganelia, Xylophylla*, and many others formerly regarded as distinct genera. ORD. *Euphorbiaceæ.* A vast genus (about 450 species have been enumerated) of mostly stove herbs, shrubs, or trees, of various habit, broadly dispersed over the tropics, but rare in temperate regions. Flowers small, monœcious, very rarely dicœcious, apetalous, axillary or rarely in the nodes of leafy branchlets; sepals six, five, or rarely four, distinct or rarely shortly connate at base, imbricate, more or less distinctly biseriate. Leaves entire, alternate or rarely opposite, generally distichous, and so arranged in opposite rows along the smaller branches as to give them the appearance of pinnate leaves. This

Phyllanthus—*continued.*

genus contains but few species of any horticultural value, those undermentioned being exceptional. A compost of sandy loam and fibry peat, to which is added a small quantity of broken bricks, charcoal, and dried cow-dung, is most suitable for their culture. Propagated by cuttings of the hard shoots, inserted in a sandy soil, in heat. The species described below require stove treatment, except where otherwise stated.

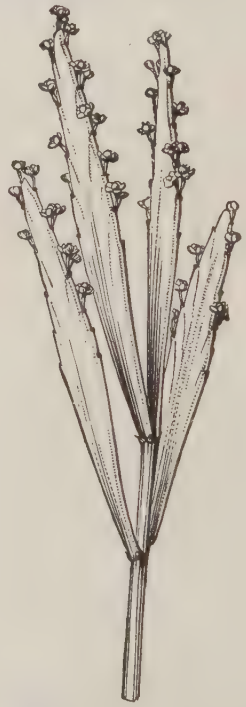


FIG. 128. BRANCH OF PHYLLANTHUS ANGUSTIFOLIUS.

P. angustifolius (narrow-leaved). *fl.* fasciculate, as long as the pedicels; calyx red. July. Stem 2ft. high. Branches deciduous, compressed; branchlets distichous, lanceolate-linear or lanceolate, serrulated from above the base, striate-veined. Jamaica, 1789. Shrub. See Fig. 128. (B. M. 2652, under name of *Xylophylla montana*; L. B. C. 1091, under name of *Xylophylla elongata.*)

P. atropurpureus (dark purple). *l.* rich dark purple, bluntly ovate. Stems terete. South Sea Islands, 1876. Shrub. In habit and aspect, this species is the counterpart of *P. nivosus*; it is deciduous during the resting season, and puts forth its new leaves, which, at first, are of a dark green colour, but the purple hue is soon developed under the influence of light, in which rich colour the plant becomes robed. It forms a slender-growing subject.

P. Chantrieri (Chantrier's).* *fl.*, males in clusters of two or three, sometimes solitary, brick-red, fringed with pale yellow hairs; females larger than the males, solitary towards the tips of the branches. Summer. Branches forming a right angle with the stem, and having the aspect of pinnate leaves, glossy green. Cochin China, 1882. An elegant shrub, of symmetrical habit. See Fig. 129. (R. H. 1883, p. 557.)

P. falcatus (sickle-shaped). *fl.* glomerate; calyx red. July. Stem 6ft. high. Branches deciduous, cylindrical; branchlets falcate or linear-falcate, serrated above, striate-veined, 4in. to 5in. long. West Indies, 1699. Shrub. (B. R. 373, under name of *Xylophylla falcata.*)

P. nivosus (snowy). *l.* ovate, alternate, frequently entirely covered with a mottling of white, but, in some cases, partially veined with green. Stem terete. South Sea Islands, 1873. A very desirable shrub, of a free-branching habit; when well developed, it has the appearance of a sheet of snow. (F. M. n. s. 120; I. H. 332.)

P. pallidifolius (pale-leaved).* *fl.* yellow, red at the base; peduncles bright red, those of the males on the lower axils, solitary or few together, those of the females towards the ends of the branches, stouter, solitary. Summer. *l.* broadly oblong, blunt at both ends, apiculate, glabrous, glaucous beneath;

Phyllanthus—*continued.*

petioles very short. Java. A small and very ornamental shrub. SYN. *Reidia glaucescens* (B. M. 5437).

P. salviæfolius (Salvia-leaved). *fl.*, males greenish, small, on long, filiform pedicels; females tinted with red, larger, on short pedicels. Summer. *l.* close-set, distichous, sub-sessile, ovate-oblong, pubescent above, tomentose beneath. Branches much spreading. New Grenada, 1883. Greenhouse shrub. See Fig. 130. (R. H. 1883, 34-36.)

FIG. 129. PHYLLANTHUS CHANTRIERI.

P. Seemannianus (Seemann's). *fl.* whitish, inconspicuous but curious, axillary. Branches long, leaf-like, bearing shortly-stalked, alternate leaves. *h.* 2ft. New Hebrides, 1879. An interesting, erect shrub.

FIG. 130. PHYLLANTHUS SALVIÆFOLIUS.

P. speciosus (showy). *fl.* fasciculate; calyx whitish; pedicels three or four times as long as the flowers. September. Stem

Phyllanthus—*continued.*

6ft. to 8ft. high. Branches deciduous, cylindrical or sub-compressed; branchlets 2in. to 3in. long, distichous, lanceolate, striated only by the principal, somewhat distant veins. Jamaica, 1818. Shrub. (B. M. 1021, under name of *Xylophylla latifolia*).

PHYLLARTHRON (from *phyllon*, a leaf, and *arthros*, a joint; in allusion to the leaflets, which were considered to be jointed to the leaf-stalk). SYN. *Arthrophyllum.* ORD. *Bignoniaceæ.* A genus comprising about five species of glabrous, stove trees, confined to Madagascar. Flowers disposed in short, sub-sessile cymes at the tips of the branches; calyx campanulate, very shortly or acutely five-toothed; corolla tube enlarged above; limb sub-bilabiate, the lobes all ample, rotundate, spreading. Fruit one-valved; seeds almost round. Leaves opposite, whorled, or scattered two to five from the joints, oblong-cuneate or almost obovate, flat, coriaceous, shining, compound. The only species in cultivation is the under-mentioned. It thrives in a compost of sandy loam or fibry peat, to which may be added a small quantity of leaf mould and charcoal. Propagation is effected by cuttings of stubby side shoots, inserted in sand, under a bell glass, in bottom heat.

P. Bojeriana (Bojer's).* *fl.*, corolla funnel-shaped, 1¼in. long, velvety without; lobes five, pink, very obtuse, broad; raceme terminal, sub-corymbosely trichotomous. July. Branches trigonal or sub-ancipital; true leaves absent, but rachis developed into a leaf-like expansion, which is constricted above the middle; lower portion obovate-cuneate, upper one elliptical. *h.* 3ft. 1844. SYN. *Arthrophyllum madagascariense.* (B. M. 4173.)

PHYLLAUREA. A synonym of *Codiæum.*

PHYLLIS (from *phyllon*, a leaf; the beauty of the species resides in its leaves). ORD. *Rubiaceæ.* A monotypic genus. The species is a glabrous or pilose, ornamental, greenhouse under-shrub, with terete branchlets. It succeeds in a strong, rich mould. Propagation may be effected by cuttings, which will root freely if inserted in sand, under a glass.

P. Nobla (Nobla). Bastard Hare's-ears. *fl.* white, hermaphrodite or polygamous, minute, disposed in terminal and axillary, many-flowered panicles; calyx tube ovoid, compressed, the limb two or five-toothed; corolla rotate-campanulate, with a four or five-parted valvate limb; florifcrous pedicels erect; fruit-bearing peduncles nodding. June. *l.* opposite, or in whorls of three or four, ovate-lanceolate, acute; stipules connate, with the petiole in a sheath, entire. *h.* 3ft. Canary Islands and Madeira, 1699. *P. N. paucifiora* is a variety in which the flowers are less freely produced.

PHYLLOBIUS. A genus of small beetles, belonging to the great family of Weevils. The form, size,

FIG. 131. PHYLLOBIUS OBLONGUS. (Lower figure is natural size; upper figure is enlarged.)

and general appearance are shown in Fig. 131. It will be observed that the beak is short and thick, and that the antennæ arise not far from the eyes, and are sharply elbowed. The body is often ornamented with scales of metallic lustre. The very numerous species are to be found on trees and bushes. One of the commonest is *Phyllobius oblongus* (see Fig. 131). This insect has

Phyllobius—*continued.*

the body black, covered with grey hairs, and occasionally shows a brown or red tinge on the wing-cases. The legs and antennæ are reddish or brownish-yellow. In summer, it gnaws the buds and the young leaves of most fruit-trees, often doing considerable damage. Other species that, at times, are hurtful in the same way, are *P. Pyri* (which is much like the last, but bears narrow, green, blue, or coppery scales, and has rusty-red legs and antennæ) and *P. viridicollis* (smaller, with a black, shining body, covered on the sides of the thorax and the breast with green scales; and red legs and antennæ).

Remedy. The most effectual is to beat the trees in the early morning, especially in dull weather, over an inverted umbrella, and to kill the beetles so collected in boiling water. A box or tray, tarred inside, may be used instead of an umbrella.

PHYLLOCACTUS (from *phyllon*, a leaf, and *Cactus*; in reference to the leaf-like stems). SYN. *Phyllocereus.* Including *Disocactus.* ORD. *Cacteæ.* A genus comprising about thirteen species of stove, epiphytal, succulent shrubs, natives of tropical America, from Mexico to Peru. Flowers rose, white, or red, axillary from the base of the rounded sinuses of the flattened, leaf-like branches; calyx tube generally long, slender, smooth; lobes remotely scattered, coloured; petals numerous, very rarely few, spreading; stamens numerous; stigma many-rayed. Fruit baccate, angular, smooth, ribbed; seeds kidney-shaped; cotyledons connate, sub-foliar. The botanical characteristics of a flower of *Phyllocatcus* are shown in Fig. 132, where *a* represents the calyx tube; *b*, calyx lobes; *c*, petaloid calyx lobe; *d*, petals; *e*, style; *f*, ovary.

FIG. 132. LONGITUDINAL SECTION OF FLOWER OF PHYLLOCACTUS.

The species of *Phyllocactus* are of easy culture; they prefer a rather dry stove or warm greenhouse temperature, but will succeed in a frame, or even a window, after being once established. The most suitable soil is a light, porous loam, with some leaf mould and brick rubble intermixed. Drainage to the extent of one-fourth should be given, and rather small pots used in proportion to the size of plant. When plants have attained a good size, and their pots are filled with roots, an annual top-dressing of soil and cow-manure should be given, and during the growing season a little liquid manure may also be applied. Watering must be rather carefully conducted, especially in winter: the roots soon die if kept too wet, or in too great a bulk of soil. Phyllocacti do not require any shade from sunshine, and they may be placed under a sunny south wall outside from about the end of June until the end of August; this greatly assists the ripening. They should be kept rather dry in winter. Cuttings of the mature shoots, about 6in. in length, taken before growth has commenced, in spring, and inserted singly in well-drained 3in. or 4in. pots, will root in a short time, if placed in a temperature of about 60deg. They should not be covered with a glass or watered, beyond the slightest syringing, to prevent the soil becoming very dry. Seeds ripen freely on healthy plants; they should be sown in spring, and placed in about the same temperature as cuttings. When the seedlings appear, a light position must be afforded them until they are large enough to pot off singly.

Phyllocactus—*continued.*

FIG. 133. BRANCH OF PHYLLOCACTUS ACKERMANNI.

P. Ackermanni (Ackermann's).* *fl.* with rich crimson, shining petals, the outer ones lighter in colour, from 6in. to 8in. in diameter, freely produced in the depressions of the stems. Summer. Stems flat, deeply crenated or notched, seldom with any spines in the notches except when young. Mexico, 1829. One of the handsomest species grown; from it a number of beautiful varieties have been raised. See Fig. 133. (B. M. 3598; B. R. 1331, under name of *Cactus* (*Epiphyllum*) *Ackermanni.*)

P. anguliger (angle-bearing).* *fl.* from 3in. to 5in. in diameter; petals white; sepals orange or yellowish, narrow, and spreading, open during the day, and emitting a powerful fragrance. October. Stems deeply angled, 2in. to 3in. in diameter, indented on the margin somewhat like a large saw with the teeth turned upwards, forming blunt, triangular lobes. Mexico. A very distinct species. See Fig. 134. (B. M. 5100; L. & P. F. G. 34.)

P. biformis (two-formed). *fl.* somewhat ephemeral, terminal at the points of the branches; petals narrow, 2in. to 3in. long, partially combined into a kind of tube of a pale rosy-pink colour. Branches narrow, flattened and leaf-like, reddish on the margins. Plant branching freely, forming a rather graceful, fleshy shrub. *h.* 3ft. Honduras, 1839. Not a very showy species. See Fig. 135. (B. M. 6166.) SYN. *Disocactus biformis* (B. R. 1845, 9).

P. crenatus (crenated).* *fl.* creamy-white in the centre; outer petals narrow and more orange-coloured, very fragrant, and from 6in. to 8in. in diameter. Stems flat, slightly crenated. Honduras, 1839. A handsome species, from which a great number of lovely hybrids have been raised. (B. R. 1844, 31, under name of *Cereus crenatus.*) The variety known as *coccineus* has large, scarlet flowers, which open widely. Mr. C. M. Hovey, Boston, U.S., has produced a race of hybrids between *Phyllocactus crenatus* and

Phyllocactus—*continued.*

FIG. 134. PHYLLOCACTUS ANGULIGER.

what he terms *Epiphyllum splendidus*, but which is presumably some scarlet form of *Phyllocactus*. They were raised about the year 1870; their flowers, which often measure from 8in. to 12in. across, are very profusely produced. The best are as follows: ALICE WILSON, orange-scarlet; MAUVE QUEEN, purplish-pink; ORANGE GEM, shining orange; PINK QUEEN, mauve-pink; REFULGENCE, dark scarlet; and SUNSET, rich crimson.

P. Hookeri (Hooker's). *fl.* agreeably fragrant, produced on the margin of the stems; tube long, narrow; petals white, tapering, 2in. to 3in. long, and about ½in. broad. July to September. Branches and stems flat, and deeply crenated, 2ft. to 3ft. high. South America. SYN. *Cactus Phyllanthus* (under which name it is figured in B. M. 2692).

P. latifrons (broad-stemmed).* *fl.* very large, 7in. to 8in. long, about 6in. in diameter; petals of a delicate creamy-white; sepals and tube of a reddish hue. Stems stout, flattened, 4in. to 5in. broad, deeply crenated, 8ft. to 10ft. high. Mexico. A very strong-growing species. SYNS. *Cereus latifrons* (B. M. 3813), *C. oxypetalus*.

P. phyllanthoides (Phyllanthus-like).* *fl.* 2in. to 3in. long, 3in. to 4in. across at the mouth; petals ovate or lanceolate, and coloured rose and white, in irregular streaks. June. Stem flat, the margin crenated, and the centre reddish. *h.* 1ft. to 3ft. Mexico, 1810. A very beautiful species, and one of the most floriferous of the family. SYNS. *Cactus phyllanthoides* (B. M. 2092), *C. speciosus* (B. R. 304).

P. Phyllanthus (leaf-flowering). *fl.* white or creamy-white, 9in. to 12in. long, tubular, opening at night and exhaling a peculiar odour. June. Branches flattened and crenated. *h.* 1ft. to 3ft. South America, 1710. This species is inferior to many others of the genus. SYNS. *Cereus Phyllanthus, Epiphyllum Phyllanthus*.

The following forms are also worth growing: *P. caulorrhizus*, flowers handsome, 6in. in diameter, the petals white and the sepals pale green; *P. Jenkinsoni*, a hybrid, or seedling, with large, handsome, brilliant crimson flowers; *P. multiflorus*, flowers reddish-crimson, the surface of the petals having a peculiar, satin-like lustre.

PHYLLOCALYX (from *phyllos*, a leaf, and *kalyx*, calyx; alluding to the leafy calyx). ORD. *Myrtaceæ*. A genus comprising about twenty-four species of trees or shrubs, now included, by the authors of the "Genera Plantarum," under *Eugenia*. For culture of *P. edulis*, the only species which calls for description here, *see* **Myrtus**.

P. edulis (edible).* *fl.* axillary or lateral, solitary, with four oblong, leafy sepals, four perigynous petals, and numerous stamens. *fr.* yellow, oblong, about 1½in. long, exhaling a strong, Pine-apple odour, and with a fine aromatic taste. *l.* distichous, oval or obovate-oblong, coriaceous, acuminate, shortly stalked. Brazil, 1884. A very interesting stove or greenhouse shrub. (R. H. 1884, p. 348.)

PHYLLOCEREUS. A synonym of **Phyllocactus** (which *see*).

PHYLLOCLADUS (from *phyllon*, a leaf, and *klados*, a branch; alluding to the phyllodia, which are characteristic). Celery-leaved Pine-tree. SYN. *Thalamia*. ORD. *Coniferæ*. A small genus (four species) of greenhouse, evergreen shrubs or trees, with mostly sub-verticillate branches, natives of Tasmania, New Zealand, and Borneo. Flowers monœcious (or dicœcious?), the males fasciculate at the apices of the branches, or solitary in the axils; staminal column sessile and small, or stipitate and rather long. True leaves minute, scale-like, alternate or scattered in a somewhat spinal manner, sometimes all abortive; phyllodes flabellate or pinnate, irregularly toothed or lobed. Cones fleshy, sometimes scarcely two lines in diameter, sometimes ovoid-globose, six lines long. The species, all of which have been

FIG. 135. PHYLLOCACTUS BIFORMIS.

Phyllocladus—*continued.*

introduced, succeed in a strong, loamy soil. They may be increased by means of cuttings of the ripened shoots, inserted in sand, under a bell glass, in spring. Bottom heat should be withheld until the cuttings commence swelling at the base.

FIG. 136. PHYLLOCLADUS GLAUCA, showing Habit, detached Branch, Phyllode, and Cluster of Fruits.

P. glauca (glaucous). Male catkins terminal, cylindric, anthers yellow; female catkins at the extremities of the phyllodes, sessile, narrow. Phyllodes fan-wedge-shaped, irregularly lobed, thick, coriaceous, rusty-green above, light shining green beneath. Seeds shining, about the size of a grain of Hemp. Tasmania, 1853. Shrub or small tree. See Fig. 136.

P. hypophylla (under-leaf). Phyllodes narrow, ovate-rhomboid or ovate-oblong, obliquely cuneate at base, scarcely attenuated into a petiole, crenate-lobed; lobes oblong, obtuse, crenulated, glaucous beneath. *h.* 10ft. to 30ft. Borneo. Tree.

P. rhomboidalis (rhomboidal).* Adventure Bay Pine. *l.*, real ones, or scales, very small and subulate or fine-pointed. Cladodia, or deciduous leaf-like branchlets, cuneate or rhomboidal, obtuse, obtusely toothed or lobed, ¾in. to 2in. long. New Zealand, 1825. A slender tree, 60ft. in height, or reduced to a shrub on the tops of mountains. SYN. *Podocarpus asplenifolius.*

P. trichomanoides (Trichomanes-like). Phyllodes distichous, with scales (rudimentary leaves) at their base, ½in. to 1in. long, obliquely rhomboid, cuneate, or ovate, simple or pinnatifidly lobed; lobes truncate, erose. *cones* compressed, solitary on the margins of the phyllodes. *h.* 40ft. New Zealand, 1840. A slender tree.

PHYLLOCYCLUS. Included under *Canscora.*

PHYLLODES. A synonym of **Phrynium** (which *see*).

PHYLLODES. Flattened leaf-like petioles (without blades). A large number of the Australian Acacias bear no true leaves, but Phyllodes, which perform the same functions.

PHYLLODIUM. Included under **Desmodium** (which *see*).

PHYLLODOCE (name of a nymph mentioned by Virgil; with an allusion to the shining leaves in the derivation *phyllon*, a leaf, and *dokein*, to shine). ORD. *Ericaceæ.* A genus comprising only three species of small, hardy, Heath-like shrubs, inhabiting the mountainous and frigid regions of Europe, Asia, and North America. Flowers pink, blue, or purple, drooping, long-stalked, sub-umbellate at the tips of the branchlets; calyx five-parted, persistent; corolla ovoid, with five erect or recurved lobes; pedicels bracteate and bibracteolate at the base. Capsules erect. Leaves articulated with the branchlets, clustered, linear or linear-oblong, obtuse, entire or serrulated, coriaceous, persistent, shining, with revolute margins. The two species described below should be grown in peat, and propagated by layers.

P. cærulea (blue). A synonym of *P. taxifolia.*

P. empetriformis (Empetrum-like). *See* **Bryanthus empetrifolius.**

P. taxifolia (Yew-leaved). *fl.* lilac, few, drooping, in terminal, umbellate corymbs; corolla urceolate; pedicels ¼in. to 1¼in. long. May. *l.* shortly petioled, crowded, spreading, linear, obtuse, denticulate, ¼in. to ½in. long. Branches tubercled. *h.* 2ft. Europe (Britain), North America, &c. SYNS. *P. cærulea, Menziesia cærulea* (L. B. C. 164; Sy. En. B. 886).

PHYLLOMA. A synonym of **Lomatophyllum** (which *see*).

PHYLLOMANIA. An unusual production of leaves.

PHYLLOPERTHA HORTICOLA. *See* **May Bugs.**

PHYLLOSTACHYA. Included under **Habenaria** (which *see*).

PHYLLOSTACHYS (from *phyllon*, a leaf, and *stachys*, a spike; alluding to branchlets being furnished with leaves). ORD. *Gramineæ.* A genus comprising four or five species of arborescent, Chinese and Japanese grasses, with semi-terete stems, prominent lobes, and sub-verticillate, fascicled, leaf-bearing branchlets. Spikelets few (one to four) flowered, shortly sub-spicate, inclosed by one or two spathaceous bracts; spikes dense or loose, in loose, often numerous panicles. Leaves shortly petiolate, articulated with the sheaths, flat, tessellately veined. Whangee Canes appear to be the produce of *P. nigra*, the stems of which, "although slender, are nearly solid, and appear to be generally used for such purposes as require great strength and toughness. Chairs, pipe-stems, and walking-sticks are often seen in England made from the culms of this species" (T. L. S. xxvi. 35).

P. bambusoides (Bambusa-like). *fl.*, fertile spikelets three to five-flowered, ten to twelve lines long; spikes 1in. to 2in. long; inflorescence very variable, usually with the aspect of a panicle, 2ft. long. *l.* oblong-lanceolate, rounded or attenuated at base, petiolate, very acute at apex, usually 3in. to 4in. long, and ¼in. to ¾in. broad. Culms reed-like, 10ft. to 12ft. high, unarmed, semi-terete, yellow, very smooth above, the nodes prominent, highly glabrous. Japan.

P. nigra (black).* *l.* linear-lanceolate, acuminate at apex, rounded or attenuated at base, shortly petiolate, usually 2in. to 3in. long, and four to six lines broad, one or both margins bristly ciliated, glabrous above, pale and almost pubescent beneath. Culm sometimes dwarf, 4ft. to 5ft. high, sometimes (in cultivation, *e.g.*, a fine specimen in the Crystal Palace, Sydenham, which was, unfortunately, destroyed by fire there) 25ft. high. China and Japan. SYN. *Bambusa nigra.*

PHYLLOSTICTA. *See* **Sphaeropsideæ.**

PHYLLOTA (from *phyllon*, a leaf, and *ous, otis*, an ear; referring to the shape of the leaves). ORD. *Legu-*

Phyllota—*continued.*

minosæ. A genus comprising six species of Australian, usually Heath-like, greenhouse shrubs. Flowers axillary or terminal; bracteoles often leaf-like, inserted under the calyx, and usually closely pressed to it; two upper calyx lobes broader, sometimes united into an upper lip; petals clawed; standard nearly orbicular, longer than the lower petals; wings oblong; keel much incurved. Pods ovate, somewhat turgid, two-valved. Leaves scattered, simple, linear, with revolute margins. For culture of *P. phylicoides* — the only species introduced — *see* **Pultenæa**.

P. aspera (rough). A synonym of *P. phylicoides*.

P. comosa (tufted). A synonym of *P. phylicoides*.

P. phylicoides (Phylica-like). *fl.* yellow, almost sessile in the upper axils, forming terminal, leafy heads or spikes, or becoming lateral by the elongation of the terminal shoot; calyx ¼in. long, glabrous or villous, the lobes about as long as the tube; standard nearly ½in. long, the lower petals rather shorter. May. *l.* numerous, narrow-linear, ½in. to ¾in. long, obtuse or with recurved points, the margins revolute, tuberculate, scabrous, sometimes sprinkled with erect hairs. *h.* 2ft. 1824. SYNS. *P. aspera*, *P. comosa*, *P. squarrosa*.

P. squarrosa (squarrose). A synonym of *P. phylicoides*.

PHYLLOTÆNIUM. Included under **Xanthosoma** (which *see*).

PHYLLOTRETA. A genus of leaf-eating beetles, in which are included several species, of small size, but of great importance, because of the amount of harm certain of them do to Turnips. Most of the species are partial to some one species or genus of plants, several of them preferring *Cruciferæ*. They were formerly referred to the very large genus *Haltica*, or *Altica*, which has been divided, for convenience, into several genera on minor points of structure. The species included in the old genus *Haltica* have the thighs of the hind pair of legs much thickened, enabling the beetles to leap considerable distances; and this habit has gained for them their popular name of Turnip Fleas. Like most beetles of the group *Chrysomelidæ*, to which they belong, they have oval bodies, with well-developed, though not very long, legs and antennæ. The colour is usually shining black, blue-black, or green-black, with the thorax, head, and limbs, in some, red or brown-red. In a few, the elytra bear yellowish stripes. For injuries done by them, and remedies, *see* **Turnip Flea.**

PHYLLOXERA. *See* **Grape or Vine Louse.**

PHYLLUM. Greek for Leaf. Used in conjunction with numerals, *e.g.*, Diphyllous, two-leaved; Triphyllous, three-leaved, &c.

PHYMATANTHUS. Included under **Pelargonium** (which *see*).

PHYMATODES. Included under **Polypodium** (which *see*).

PHYMOSIA. A synonym of **Sphæralcea** (which *see*).

PHYSALIS (from *physa*, or *physalis*, a bladder; alluding to the inflated calyx). Ground or Winter Cherry. SYN. *Pentaphiltrum*. ORD. *Solanaceæ*. A genus comprising not more than thirty species of greenhouse or hardy, mostly annual or perennial herbs, clothed with simple or stellate hairs; the majority of the species are American, being most frequent in Mexico and North America, but a few are broadly dispersed over the warmer regions of the globe. Flowers violet, yellowish, or white, often purple at maturity, frequently small, solitary in the axils, pedicellate; calyx campanulate or pyramidal, five-fid, inflated during fructescence; corolla broadly campanulate or almost rotate; limb five-angled or shortly five-lobed. Berry globose, included in the inflated calyx. Leaves entire, sinuated, or rarely pinnatifid. Very few of the species are of any horticultural value. *P. Alkekengi* is ornamental, in autumn and winter,

Physalis—*continued.*

when its fruits are ripe, on account of the highly-coloured, inflated calyx. This becomes skeletonised in due course, if left on the plant. *P. peruviana edulis* is occasionally grown as a dessert fruit, some people liking its peculiar flavour. The species described below are all herbaceous perennials, and will thrive in any common garden soil. Propagation of the annual species may be effected by seeds, and of the perennials by seeds and by division.

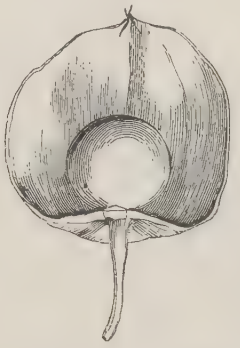


FIG. 137. FRUIT OF PHYSALIS ALKEKENGI, with part of accrescent Calyx removed.

P. Alkekengi (Alkekengi).* Winter Cherry. *fl.* white, with yellow anthers; mature calyx blood colour; corolla not spotted. July. *fr.* scarlet, edible. *l.* deltoid-ovate, acuminate, repand, long-stalked, attenuated into the petioles, including which they are 3in. to 4in. long, and 1½in. to 2in. broad. Stem almost simple. Roots creeping. *h.* 1ft. Caucasus, China (naturalised in North America), 1548. Hardy. See Fig. 137. (S. F. G. 234.)

P. peruviana (Peruvian). Cape Gooseberry. *fl.* whitish, with violet anthers; mature calyx pale, ovate; corolla spotted. July. *fr.* purplish. *l.* cordate, acuminate, entire or sinuate-toothed, slightly tomentose. Stem erect, somewhat branched. *h.* 3ft. South America, 1772 (naturalised in many warm countries). Greenhouse. Plant densely villous-pubescent.

P. p. edulis (edible).* *fr.* yellow, edible. *l.* almost entire. (B. M. 1068, under name of *P. edulis*.)

P. p. violacea (violet-fruited).* *fl.* yellow, with a dark purple spot at the base of each lobe. *fr.* dark violet, large, globose. *l.* cordate, acute. *h.* 3ft. Mexico, 1883. This is probably an improved cultivated form, with larger fruits than the type. (B. H. 1882, p. 216, under name of *P. violacea*.)

PHYSAPTERIS. Included under **Cheilanthes** (which *see*).

PHYSEMATIUM. Included under **Woodsia** (which *see*).

PHYSIANTHUS (from *physa*, a bladder, and *anthos*, a flower; referring to the shape of the flowers). SYNS. *Pentaphragma*, *Schubertia*. ORD. *Asclepiadeæ*. A genus regarded, by the authors of the "Genera Plantarum," as synonymous with *Arauja*. It comprises about thirteen species of stove or greenhouse, climbing, canescent or hirsute shrubs or sub-shrubs, natives of tropical and sub-tropical America. Flowers dirty white or pink, large; calyx five-parted, the segments leafy; corolla hypocrateriform or almost infundibular, with a spreading or sub-campanulate, five-fid limb; corona adnate to the base of the corolla; cymes two or few-flowered, on a solitary, axillary peduncle. Leaves opposite. The species thrive in a compost of sandy loam and fibry peat, with good drainage. Propagated, in summer, by cuttings of firm, stubby side-shoots, inserted under glass, in a gentle heat; or by seeds, sown on a hotbed, during spring. *P. albens* suceeeds in a greenhouse, and is well adapted for training up a pillar or rafter.

P. albens (whitish).* White Bladder Flower. *fl.* white, with a tinge of red, downy, with a campanulately-urceolate corolla; cymes sub-dichotomous. July. *l.* opposite, cordate, white and pruinose beneath, beset with fine, white, scattered hairs above. Brazil, 1830. Greenhouse climbing shrub. SYN. *Arauja albens*.

Physianthus—*continued.*

See Fig. 138. (B. M. 3201; B. R. 1759.) In favoured spots, this will succeed in the open air against a sheltered wall.

P. auricomus (golden-haired). A synonym of *P. graveolens.*

FIG. 138. PORTION OF FLOWERING STEM AND DETACHED FLOWER OF PHYSIANTHUS ALBENS.

P. graveolens (strong-scented). *fl.* white, in umbels of six or seven. July. *l.* cordate-obovate, obtuse, softly pubescent, shining above. *h.* 10ft. Brazil, 1835. Stove climbing sub-shrub. SYNS. *P. auricomus* (B. M. 3891), *Schubertia graveolens* (B. R. xxxii. 21).

P. megapotamicus (Rio Grande). *fl.* green, white, and purple; lobes of corona denticulated; corolla rotate-campanulate; stigma exserted; peduncles one-flowered. June. *l.* narrow-lanceolate-hastate, acuminate. *h.* 20ft. Uruguay, 1865. Greenhouse climbing sub-shrub. SYN. *Araujа angustifolia.* (B. M. 5481.)

PHYSIDIUM (from *physa*, a bladder, and *eidos*, resemblance; in allusion to the shape of the lower lip). SYNS. *Schelveria, Thylacantha.* ORD. *Scrophularineæ.* A small genus of stove herbs, or rarely sub-shrubs, natives of South America, now regarded, by Bentham and Hooker, as synonymous with **Angelonia** (which *see* for culture).

P. cornigerum (horn-bearing).* *fl.* rich purple, deeper towards the mouth, the upper segments sprinkled with velvety dots, the intermediate one of the lower lip furnished at base with a horn-like process; peduncles single-flowered, hairy. August. *l.*, lower ones opposite, lanceolate; the rest alternate but approximate, small and bract-like. *h.* 1ft. or more. Brazil, 1839. Annual. SYN. *Angelonia cornigera* (B. M. 3848).

P. Gardneri (Gardner's). *fl.* purple, white in the centre, dotted with red, handsome, in long, terminal, leafy, bracteate racemes; pedicels solitary in the bracts. May. *l.* opposite, lanceolate, sessile, acuminate, regularly serrated. Stem erect, about 3ft. high; branches, as well as the leaves and peduncles, glandular-pubescent. Pernambuco, 1838. Sub-shrub. SYN. *Angelonia Gardneri* (B. M. 3754).

PHYSINGA. Included under *Epidendrum.*

PHYSOCALYCIUM. A synonym of *Bryophyllum.*

PHYSOCHLAINA (from *physa*, a bladder, and *chlaina*, an outer garment; alluding to the inflated calyx). SYN. *Belenia.* ORD. *Solanaceæ.* A small genus (four species) of hardy, erect, glabrous, perennial herbs, natives of Central Asia. Flowers erect or scarcely drooping, disposed in a loose or dense, terminal corymb; calyx tubular-campanulate, five-fid, including the capsule; corolla funnel-shaped or somewhat campanulate, the limb of five broad, erecto-patent, imbricated lobes. Leaves membranous, entire or sinuated. The three species introduced are very

Physochlaina—*continued.*

desirable plants, producing their elegant flowers early in the season. They thrive in any ordinary soil, and may be readily increased by cuttings, or by seeds.

P. grandiflora (large-flowered). *fl.* greenish-yellow, with purple markings, drooping; corolla above 1in. long, between campanulate and funnel-shaped, with a spreading mouth; panicle terminal, leafy. March. *l.* alternate, petiolate, ovate, acute, penninerved, thrice as long as the petiole. Stem glandular-downy. *h.* 1½ft. Thibet. (B. M. 4600.)

P. orientalis (Eastern). *fl.* pale purplish-blue, pedicellate, fasciculately and capitately racemose; calyx much longer than the capsule; corolla widening gradually to the top. March to May. *l.* petiolate, deltoid-ovate, repand or entire, acute, downy. *h.* 1ft. to 1½ft. Iberia, 1821. (B. M. 2414 and S. B. F. G. 12, under name of *Hyoscyamus orientalis.*)

P. physaloides (Physalis-like).* *fl.* purplish-violet, pedicellate, terminal, capitately corymbose; calyx much larger than the capsule. March and April. *l.* petiolate, ovate, acute, somewhat repand or quite entire. *h.* 1ft. to 1½ft. Siberia, 1777. (B. M. 852 and S. B. F. G. 13, under name of *Hyoscyamus physaloides.*)

PHYSODEIRA. Included under **Episcia** (which *see*).

PHYSOLOBIUM. Included under *Kennedya.*

PHYSOSIPHON (from *physao*, to inflate, and *siphon*, a tube; referring to the slightly-inflated tube of the flowers). ORD. *Orchideæ.* A small genus (about four species) of stove epiphytal orchids, natives of tropical America, having the habit of *Pleurothallis.* Flowers small, in elongated racemes; sepals connate at base into an ovoid or urceolate tube, which is three-fid at the apex; petals fleshy, obovate-cuneate; lip small, articulated with the base of the column, in form like the other petals; pollen-masses two, ovoid. The species are of no great horticultural value. Those described below require culture similar to **Pleurothallis** (which *see*).

P. Loddigesii (Loddiges'). *fl.* yellow-green in the lower half, the rest deep red-orange, distantly disposed in an erect, racemose spike; scape very slender, filiform. July. *l.* solitary, one-nerved, oblong, sub-spathulate, obtuse. Rhizome slender, giving rise to several plants. Mexico. (B. M. 4869; L. B. C. 1601, under name of *Stelis tubata.*)

P. punctulatus (slightly-dotted). *fl.* greenish-yellow, purple-spotted, minute. *l.* cuneate-oblong. Bogota, 1870. An insignificant orchid. (Ref. B. 96.)

PHYSOSPERMUM (from *physa*, a bladder, and *sperma*, a seed; the teguments do not adhere to the seed in a young state). Bladder Seed. SYNS. *Danaa, Hænslera.* ORD. *Umbelliferæ.* A small genus (from two to five species have been quoted as distinct by various authors) of hardy, glabrous, perennial herbs, natives of Caucasian Europe and Asia. Flowers white, in compound, many-rayed umbels. Leaves ternato-pinnately decompound; segments cuneate, incised. The species have no horticultural value. *P. cornubiense* is a British plant.

PHYSOSPERMUM (of Cusson). A synonym of **Pleurospermum** (which *see*).

PHYSOSTEGIA (from *physa*, a bladder, and *stege*, a covering; alluding to the inflated calyx). False Dragon-head. ORD. *Labiatæ.* A genus consisting of

Physostegia—*continued.*

only three species of hardy, tall, erect, glabrous, or very slender and puberulous herbs, confined to North America. Flowers flesh-colour or purple, sessile; calyx tubular-campanulate, sub-equally five-toothed, becoming inflated at fructescence; corolla tube long, exserted; upper lip erect, entire or emarginate, the lower one spreading and trifid; whorls two-flowered, secund, densely or interruptedly spicate; spikes solitary, or often many, at the tips of the branches, sub-paniculate. For culture, *see* **Dracocephalum.**

P. imbricata (imbricated). A synonym of *P. virginiana speciosa.*

P. intermedia (intermediate). *fl.*, corolla five to six lines long, much dilated upwards; spikes filiform, commonly rather remotely flowered. Summer. *l.* linear-lanceolate, repand-denticulate. Stem slender, remotely leaved, 1ft. to 3ft. high.

P. parviflora (small-flowered). *fl.*, corolla rather narrow, ½in. long; spikes short, 1in. to 4in. long. Summer. *l.* lanceolate or ovate-lanceolate, denticulate. Stem rather slender, leafy, 1ft. to 2ft. high. 1825.

P. virginiana (Virginian).* *fl.* flesh-coloured or purple, about 1in. long, nearly sessile, approximate or distant; racemes terminal, simple, or paniculately branched. July to September. *l.* thickish, sessile, usually lanceolate, sometimes oblong-ovate or obovate, usually acute, irregularly and acutely serrated, narrowed at base, green on both surfaces. Stems erect, herbaceous. *h.* 1½ft. to 4ft. 1683. A variable species. Syns. *Dracocephalum variegatum, D. virginianum* (B. M. 467).

P. v. denticulata (slightly-toothed). *fl.* in a more slender or loosely-flowered spike. *l.* crenulate-denticulate or obscurely serrated. A more slender and commonly low form. Syn. *Dracocephalum denticulatum* (B. M. 214).

P. v. obovata (obovate). *l.* oblong or obovate, often obtuse.

P. v. speciosa (showy).* *fl.* in dense, paniculate spikes. *l.* lanceolate, very acutely serrated. Syns. *P. imbricata* (B. M. 3386), *Dracocephalum speciosum*, of Sweet (S. B. F. G. 93).

PHYSOSTELMA (from *physa*, a bladder, and *stelma*, a girdle; alluding to the shape of the corona scales). Syn. *Cystidianthus.* Ord. *Asclepiadeæ.* A genus comprising a couple of species of stove, climbing, glabrous shrubs, natives of the Malayan Archipelago, usually, but erroneously, referred to *Hoya.* Flowers rather large, in umbelliform cymes; calyx five-parted; corolla very broadly campanulate, sub-cyathiform; corona scales five, fleshy, radiate-patent. Leaves opposite, coriaceous, subfleshy, shining, veined. *P. Wallichii* is the only species in cultivation. For culture, *see* **Hoya.**

P. campanulatum (bell-shape-flowered). A synonym of *P. Wallichii.*

P. Wallichii (Dr. Wallich's).* *fl.* green, yellow; corolla campanulate, glabrous. May. *l.* coriaceous, almost veinless, oblong, acuminate, glabrous; when dry, reticulately veined. 1845. Syns. *P. campanulatum, Hoya campanulata* (B. M. 4545, and B. R. 1847, 54).

PHYSOSTIGMA (from *physa*, a bladder, and *stigma*; the bearded style is terminated by a large, oblique hood covering the stigma). Ordeal Bean of Old Calabar. Ord. *Leguminosæ.* A monotypic genus. The species, *P. venenosum*, is a tall, climbing herb, shrubby at base, native of tropical Africa. Its seeds "are extremely poisonous, and are employed by the natives of Old Calabar as an ordeal; persons suspected of witchcraft, or other crime, being compelled to eat them until they vomit or die—the former being regarded as a proof of innocence, and the latter of guilt" (Lindley and Moore). This Bean is also remarkable for possessing a property causing contraction of the pupil of the eye.

P. venenosum (deadly). *fl.* purplish, resembling those of a Bean, axillary, pendulous, rather large, in a fascicled raceme; style bearded, terminated by a large, oblique hood, covering the blunt stigma. Pods dark brown, about 6in. long; seeds oblong or somewhat hemispherical, about 1in. long. *l.* pinnately trifoliolate, stipellate; leaflets ample. (B. M. Pl. 80.)

PHYSURUS (from *physa*, a bladder, and *oura*, a tail; in allusion to the shape of the spur). Syns. *Erythrodes, Microchilus.* Ord. *Orchideæ.* A genus comprising about a score species of stove, terrestrial, leafy orchids, with root fibres usually fasciculate, in a creeping rhizome, inhabiting the warmer regions of Asia and

Physurus—*continued.*

America. Flowers small or mediocre, disposed in loose or dense, often elongated, almost sessile spikes; sepals and petals nearly equal, the lateral sepals placed beneath the lip, and the dorsal agglutinated to the petals; lip parallel with the column, concave, constricted below the apex, and extended downwards into a freely-swollen spur; column free or adnate to the bottom of the lip, straight and attenuated into an ultimately bifid rostellum, having the anther at the back, containing two sectile pollen-masses attached to an oblong or subulate gland. Leaves stalked, loosely-sheathed, often beautifully marked with veins. The species here described are those introduced to cultivation. For culture, *see* **Anœctochilus** (to which the present genus is closely allied).

P. argenteus (silvery).* *l.* 2½in. long and 1½in. broad, light green, with well-defined, silvery markings. Stems 4in. in height. Brazil. An elegant, free-growing species, which does well in a warm house without a bell glass; a shady situation, and a plentiful supply of water to the roots, are important elements in its culture. Syn. *Anœctochilus argenteus.*

P. decorus (comely). *fl.* very indifferently small; sepals white, with green lines; lip small, with a yellowish-green spur. *l.* cuneate-oblong, acute, dark green, with whitish, longitudinal stripes. Probably Sumatra, 1873.

P. maculatus (spotted). *l.* 2½in. long, dark green, with two rows of white, oblong spots lying parallel with the midrib. *h.* 6in. Guayaquil, 1862. (B. M. 5305.)

P. nobilis (noble).* *l.* broadly ovate, dark green, marked with silvery veins. Brazil, 1865. A large and beautifully marked species. Very similar to *P. pictus*, but differing in its fringed lip. Syn. *Anœctochilus nobilis.*

P. Ortgiesii (Ortgies'). *l.* dark green, with a whitish midrib; spots of the same colour distributed over the entire surface. Columbia, 1873. Distinct, and very pretty. (F. & P. 1872, 243.)

P. pictus (spotted).* *l.* 3in. long, 1½in. broad, edged with dark green, and having a handsome, silver-frosted band down the centre, from which radiate a network of white veins. *h.* 6in. Brazil. A distinct and most desirable, free-growing species. (Ref. B. 73.) Syns. *Anœctochilus argenteus pictus, A. pictus, Microchilus pictus.*

P. querceticolus (Oakwood-dwelling). *fl.* borne in loose spikes; lip three-toothed at apex. *l.* 2in. to 3in. long, ovate, acute, light green, blotched with silvery-grey on each side of the midrib, imparting an appearance to the intervening spaces of being silvered over. *h.* 3in. to 4in. or more. New Orleans. A distinct, free-growing species.

PHYTARRHIZA. Included under **Tillandsia** (which *see*).

PHYTELEPHAS (from *phyton*, a plant, and *elephas*, ivory; referring to the seed, which, under the name of Ivory Nut, is largely imported and used by turners in forming small, ivory-like toys, buttons, &c.). Syn. *Elephantusia.* Ord. *Palmæ.* A genus comprising three or more species of low, unarmed palms, with a robust and erect or prostrate and rooting caudex; they are natives of Peru and New Grenada. Plant dicœcious; male flowers with petals 2in. to 3in. long; spadices borne on scaly peduncles, males pendulous, females erect; spathes two, complete, elongated, thick, coriaceous or woody. Fruit consisting of a collection of four to six drupes, forming large clusters, the drupes covered outside with hard, woody protuberances. Leaves terminal, elongated, pinnatisect; segments numerous, the upper ones opposite, the lower ones alternate or fascicled, linear-lanceolate, acuminate; margins recurved at base. A compost of two parts rich loam, and one each of peat and river sand, is most suitable. The plants enjoy a liberal supply of water, and perfect drainage is essential.

P. macrocarpa (large-fruited).* Ivory Nut Palm; Negro's Head. *fr.* a drupe containing from six to nine seeds—the Vegetable Ivory of commerce. *l.* 15ft. to 20ft. long, erect, beautifully arched, pinnate, rich dark green; pinnæ very long. Caudex or trunk creeping, rooting. *h.* about 6ft. New Grenada, 1846. (B. M. 4913, 4914.)

P. microcarpa (small-fruited). *l.* 20ft. to 24ft. long, lanceolate, with about 100 pinnæ, the inferior being alternate and the upper opposite, linear, the largest 3in. long, 2in. wide, three-nerved. Peru, &c. Plant stemless.

PHYTELEPHUSIEÆ. Included under *Palmæ.*

PHYTEUMA (an old Greek name, meaning simply "the plant," used by Dioscorides, for a kind of *Reseda*). Horned Rampion. SYN. *Rapunculus*. Including *Petromarula*. ORD. *Campanulaceæ*. To this well-known genus about fifty plants have been referred as species, but this number may be reduced. They are mostly hardy perennial herbs, natives of Europe, the Mediterranean region, and temperate Asia. Flowers often sessile, variously disposed; calyx tube adnate, hemispherical or oblong-obconical, with a five-parted limb; corolla five-parted almost to the base, the lobes linear and cohering a long time. Radical leaves long-stalked; cauline ones alternate, smaller. The species are very pretty plants for rockwork and borders; they thrive in any moderately good garden soil. Propagation is easily effected by seeds, or by divisions, in spring. The dwarf-growing mountain species, such as *P. comosum*, like a well-drained spot in the rockery. The following are the best known; they are all hardy perennial herbs.

P. betonicæfolium (Betony-leaved). *fl.* blue; spikes ovoid, almost bractless. June. *l.* glabrous or pilose, lower ones oblong, acuminated, simply serrulated; upper ones linear-lanceolate, nearly entire. Stems glabrous. *h.* 6in. to 12in. Pyrenees, &c., 1818.

P. campanuloides (Campanula-like). *fl.* deep violaceous-blue, disposed in a spike 2in. to 3in. long, one to three together, from the axils of the bracts. June to August. *l.*, lower ones petiolate, ovate, bluntish, crenated; middle ones broad, sessile, ovate, acute, crenated; upper ones lanceolate, serrated. *h.* 1ft. to 2ft. Caucasus. 1804. (B. M. 1015.)

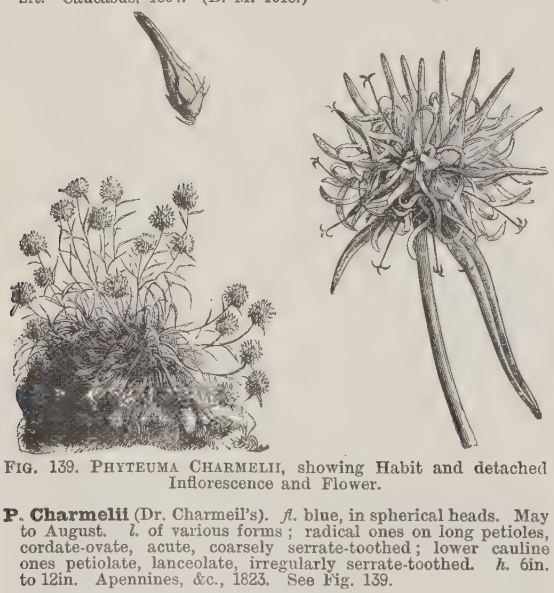


FIG. 139. PHYTEUMA CHARMELII, showing Habit and detached Inflorescence and Flower.

P. Charmelii (Dr. Charmeil's). *fl.* blue, in spherical heads. May to August. *l.* of various forms; radical ones on long petioles, cordate-ovate, acute, coarsely serrate-toothed; lower cauline ones petiolate, lanceolate, irregularly serrate-toothed. *h.* 6in. to 12in. Apennines, &c., 1823. See Fig. 139.

P. comosum (tufted).* *fl.* on short peduncles, disposed in loose, umbel-formed fascicles; corolla purple or blue, inflated at the base, tube-formed. July. *l.* coarsely and acutely toothed; radical ones on long petioles, cordate-ovate-roundish; cauline ones on short petioles, ovate-lanceolate, acute. *h.* 3in. to 6in. Dalmatia, Carniola, South of Tyrol, &c., 1752. (B. M. 6478; J. F. A. app. 50.)

P. humile (dwarf).* *fl.* blue, in globose heads. July. *l.*, radical ones crowded, linear-lanceolate, narrow at the base, nearly entire; cauline ones few, linear, entire. *h.* 3in. Switzerland, &c., 1825. See Fig. 140.

P. limoniifolium (Limonium-leaved). *fl.* blue, sessile; spikes long, interrupted. June and July. *l.*, radical ones on long petioles, quite glabrous, lanceolate, a little toothed. Stems branched. *h.* 2ft. to 3ft. South Europe, &c., 1819. (B. M. 2145, under name of *P. stricta*; L. B. C. 667, under name of *P. virgata*; S. F. G. 2183.)

P. Michelii (Micheli's). *fl.* pale or deep blue; spikes ovate; bracts reflexed. July and August. *l.* of various forms; radical ones petiolate, ovate-cordate or ovate; cauline ones linear-lanceolate. Stems simple. *h.* 1ft. to 2ft. South Europe, 1819. (B. M. 2271; B. M. 2066, under name of *P. betonicæfolium*). SYN. *P. scorzonerifolium*.

Phyteuma—*continued.*

P. orbiculare (orbicular). *fl.* deep blue, in round heads. June to August. *l.*, radical ones petiolate, lanceolate, sub-cordate, crenated; cauline ones sessile, linear-lanceolate. *h.* 6in. to 18in. Europe, &c. (in pastures and by roadsides, on a chalky soil). (B. M. 1466; Sy. En. B. 864.)

P. pinnatum (pinnate). *fl.* blue or white, pedicellate, disposed in loose racemes. August. *l.*, first radical ones petiolate, ovate, acute; the later ones pinnate, with the petioles margined and lobed. *h.* 3ft. to 6ft. Crete, 1640. (S. B. F. G. ser. ii. 224.)

FIG. 140. PHYTEUMA HUMILE, showing Habit and detached Flower.

P. Scheuchzeri (Scheuchzer's). *fl.* deep blue, in spherical heads. May. *l.* petiolate, ovate-lanceolate, bluntly serrated; lower cauline ones linear-lanceolate, acutely serrulated; upper ones linear, nearly entire. *h.* 1ft. European Alps, 1813. (B. M. 1797.)

P. scorzonerifolium (Salsify-leaved). A synonym of *P. Michelii*.

P. Sieberi (Sieber's). *fl.* deep blue, in spherical heads. May. *l.*, radical ones petiolate, ovate-roundish, sub-cordate, crenated; lower cauline ones petiolate, lanceolate, coarsely toothed; upper ones stem-clasping. *h.* 3in. to 6in. Apennines, 1826.

P. spicatum (spiked). *fl.* white, cream-coloured, or blue; spikes cylindrical, elongated. July. *l.*, lower ones on long petioles, cordate, ovate-acute, bi-serrated; upper ones ovate-lanceolate. *h.* 1ft. to 3ft. Temperate parts of Europe (Britain), 1597. (B. M. 2347; Sy. En. B. 865.)

PHYTOCRENE (from *phyton*, a plant, and *krene*, a fountain; alluding to the quantity of sap which flows from the plants when cut). SYN. *Gynocephala*. ORD. *Olacineæ*. A genus comprising about five species of tall, stove, climbing or twining shrubs, abounding in limpid juice (which is drunk by the natives of Martaban), natives of tropical Asia. Flowers villous, small, the female heads solitary, larger than the paniculate male heads. Leaves alternate, entire or palmately lobed. The wood of these plants is soft and porous, and of peculiar structure. *P. gigantea*, the East Indian Fountain-tree, is the only species introduced. It is a stove climber, of no particular horticultural value.

PHYTOCRENEÆ. A tribe of *Olacineæ*.

PHYTOLACCA (from *phyton*, a plant, and *lac*, lake; referring to the crimson juice of the fruit). ORD. *Phytolaccaceæ*. A genus comprising about half-a-score species of stove, greenhouse, or hardy shrubs, herbs, or rarely trees, erect or climbing, natives of tropical and subtropical America, Africa, and Asia. Flowers mediocre, racemose or thyrsoid, opposite the leaves; perianth herbaceous or slightly coloured, four-parted, the segments remaining unchanged during fructescence, spreading or reflexed; stamens five to twenty-five, inserted at the base

Phytolacca—*continued.*

of the perianth. Fruit sometimes deep purple, depresso-globose, succulent; carpels five to twelve, free or connate. Leaves alternate, sessile or stalked, acute or obtuse, entire; stipules none. The under-mentioned species—those best known to cultivation—are very desirable, hardy, herbaceous plants. They are of easy culture in almost any kind of soil. Propagated by seeds, or by divisions.

FIG. 141. RACEMOSE INFLORESCENCE OF PHYTOLACCA DECANDRA.

P. decandra (ten-stamened).* Virginian Poke Weed; Pigeon-berry; Red-ink Plant. *fl.* white, in long, extra-axillary racemes, succeeded, in the autumn, by dark purple berries, filled with crimson juice. *l.* ovate, petiolate, nearly 6in. long and about 2½in. broad, changing to purple in the autumn. Stem often purple, erect, divided at top. Roots large, fleshy, poisonous. *h.* 3ft. to 10ft. 1768. A vigorous-growing plant, with a rather unpleasant odour. See Fig. 141. (B. M. 931.)

P. icosandra (twenty-stamened). *fl.* pinkish-white, in a very loose raceme, 6in. to 12in. long, attenuated at the apex. *fr.* depressed at apex, watery. *l.* elliptic or oblong-ovate, acuminate, mucronate, rather thick, 4in. to 9in. long (including the slender petiole of 1in. to 3in.), and 1½in. to 4in. broad, but sometimes as much as 1ft. long. Stem 2ft. to 3ft. or more high. Mexico, &c. (B. M. 2533, 4967.) SYN. *P. mexicana* (S. B. F. G. 571).

P. mexicana (Mexican). A synonym of *P. icosandra.*

PHYTOLACCACEÆ. A natural order of trees, shrubs, or herbs, with a woody base, usually glabrous; they are mostly tropical and sub-tropical, but a few are found in temperate regions. Flowers often greenish or white, hermaphrodite or unisexual, generally racemose, rarely axillary, very often bracteate and bibracteolate; perianth herbaceous or coriaceous, rarely membranous or coloured, four or five-parted, very rarely obconical and disk-formed, with the segments imbricated in æstivation, fruit-bearing ones persistent; petals (except in one species) wanting; stamens four or many, rarely perigynous, often inserted on a hypogynous disk; filaments filiform or subulate, free or connate at base, generally persistent; racemes terminal and axillary. Fruit of one

Phytolaccaceæ—*continued.*

or more carpels. Leaves alternate, entire; stipules none, or small, or reduced to tubercles. Several species of *Phytolacca* have economic properties, mostly acrid, vesicant, or drastic. The order, which was long confounded with *Chenopodiaceæ*, contains nineteen genera and about sixty species. Examples: *Petiveria*, *Phytolacca*, and *Rivina*.

PHYTOMYZA. A genus of small, two-winged flies, the larvæ of which mine or burrow between the surfaces of the leaves of many plants, both wild and cultivated. Among the latter may be mentioned Turnips, Wallflowers, and Peas; in fact, most low garden plants, and various shrubs and trees, are liable to attack. The species of this genus are numerous, but all are of small size, about ⅛in. in spread of wing, and ⅛in. long. They are not unlike very small house-flies in form, and are usually dark, slaty-black, or ash-coloured, with the head and the legs often paler. The maggots are whitish; they tunnel out a winding gallery, which may not be visible on the upper surface of the leaf. When full-fed, they change, in the leaf, into chestnut, barrel-shaped pupæ, deeply ringed, and showing no external sign of the insect's form. The flies emerge in May and June. One of the most destructive and widespread species is *P. nigricornis*, the larvæ of which live in many different plants. *See also* **Holly-leaf Fly.** Fortunately, the mines, unless very numerous, do no great harm to the plants in whose leaves they are formed; but the unsightly blotches on choice garden plants may render the destruction of the larvæ desirable. This can be accomplished by crushing the mine, and the contained larva or pupa, between the finger and thumb; or the leaves may be picked off, and burned. Owing to the mode of life, external applications are of no avail in reaching the larvæ.

PHYTON. A plant. "A rudimentary plant, out of numbers of which perfect plants are made up" (Gaudichaud).

PHYTOPHTHORA (from the Greek *phyton*, plant, and *phthora*, destruction). A small group of parasitic Fungi, very closely allied to *Peronospora* in all important points of structure (*see* **Peronospora**), except that the stems bearing conidia (conidiophores) do not, as in that genus, produce only a single conidium on the tip of each branchlet. Instead of this, after a conidium is formed at the tip, the branch grows on from just below it, and produces a new conidium (see Fig. 142); and this process may be repeated several times. The reproduction by zoospores formed in the conidia, and also by oospores, or "resting spores," is much like that of *Peronospora nivea*. Few species are known, but of these one is the dreaded Potato-disease Fungus (*P. infestans*), too often seen wherever Potatoes are cultivated. Another is *P. Fagi* (also called *P. omnivora*), the cause of very widespread and serious disease in Beech seedlings, in many parts of Europe. It also grows well in seedlings of most of the commonly-cultivated coniferous trees, in the commoner Maples, and in many low-growing plants, *e.g.*, *Sempervivum*, *Clarkia*, &c. This latter Fungus has not yet caused damage in Britain; but, from its wide distribution, and its hurtfulness abroad, there is reason to dread its ravages should it appear in these islands. A short notice of it will, therefore, not be out of place here. It is injurious to trees only in the seedling stage, but, when it breaks out in a bed of seedlings of the kinds named above, the disease makes very rapid progress around the centres of infection. This progress is more rapid in warm, damp weather, and in shady situations, and, most of all, in beds crowded with young plants.

In the Beech, in which the disease has been most fully studied, the seedlings become black, and perish almost before germination; or they form the seed leaves and

Phytophthora—*continued.*

the first true leaves before the disease forms spots on the stems and on the various leaves. In damp weather, the diseased parts soon rot; in dry weather, they become dry and brown. All the diseased parts are penetrated by

FIG. 142. PHYTOPHTHORA INFESTANS—*a*, Entire Conidiophore, and base of a second, coming through a stoma of the leaf; on the branches are several Conidia (the thicker parts show the successive tips on which Conidia are formed in the way characteristic of the genus *Phytophthora*); *b*, Conidium, with five Zoospores inside it; *c*, Free Zoospore, with two Cilia; *d*, Zoospore, after settling down; *e*, Zoospore, emitting Mycelium. *a* is magnified about 80 times; the remainder about 400 times.

the threads of the Fungus; and numerous conidiophores, each producing two, or less often three, egg-shaped conidia, are pushed out through the skin of the stem or leaf. The conidia, if they fall into dewdrops, emit one or more mycelium threads, or they produce a number of "swarm-spores" (zoospores) in their interior, and these readily emit mycelium threads, which push in through the surface cells of the host-plants, and give rise to the disease anew. The damage thus spreads very rapidly. The Fungus is propagated in the following spring by means of the resting spores. These are produced as in *Peronospora*, and are formed in the diseased tissues. When the latter decay, the spores are scattered in the soil, there to remain till the warmth of the following spring promotes their germination. If a suitable host is at hand, the Fungus bores into it, and runs the same course as before. It has been found, experimentally, that resting spores can retain their capacity for germinating even for four years. Seed-beds of forest-trees of the species liable to injury should be established in places free from shade, and airy, to allow of free evaporation of superfluous moisture. All dead or dying plants should be at once picked out and burned. The seedlings must not be crowded. Ground where a diseased seed-bed has stood must not be used for making a new bed for some time, lest disease should break out afresh from germinating resting spores left in the soil, thus perpetuating the evil.

The Potato-disease Fungus (*P. infestans*) is one of the most hurtful of all Fungi, because of the damage it inflicts on the Potato crop; in some years, a half, or more, of the yield is destroyed. In the year 1845, the disease produced by this Fungus first came prominently into notice, since, in that year, it spread over the West of Europe, including Britain and Ireland, and over the Northern United States of America. In the latter half

Phytophthora—*continued.*

of August, the crop in our own country was blighted, causing heavy losses to farmers; while severe and fatal famine and disease followed in Ireland. In years previous to 1845, the disease of Potatoes had been observed occasionally in various places; but, since 1845, it has never been wholly absent from any country where it has once appeared, though it is much more destructive in some years than in others. The Fungus attacks several plants belonging to the same order as the Potato (*Solanaceæ*), such as the Bitter-sweet (*Solanum Dulcamara*), *Schizanthus*, and the Tomato (*Lycopersicum esculentum*). The damage done by it to the latter plant is sometimes considerable. Occasionally, it grows on plants of the order *Scrophularineæ*. The appearance of the diseased Potato-plants is too well known to require a long description. On the leaves

FIG. 143. POTATO-LEAF ATTACKED BY PHYTOPHTHORA INFESTANS, in the dark spots, *k*, *k*, *k*.

brown spots appear (see Fig. 143), rapidly extending, and becoming rotten towards the centre. The lower surface of the spot bears a thin, whitish coating, seen most distinctly on a watery-looking, discoloured border round the spot. This whitish coat consists of numerous conidiophores, emerging from the stomata in small groups. Each has a few branches, with conidia near the tips (see Fig. 142). The tissues of the leaf are full of the mycelium of the Fungus, pushed between, and lying in contact with, the cells of the leaf, and causing them to rot. Zoospores are formed in the conidia in water (*e.g.*, a dewdrop), as described under **Peronospora** (which *see*). They are set free by the conidium bursting, and each moves, by means of two fine hairs (see Fig. 142, *c*) in the water on the leaf. Each settles down after a little while, and emits (see Fig. 142, *e*) mycelium, which, in a short time, penetrates the leaf, and gives rise in it to a new diseased spot. Any movement of the diseased plants, by wind or otherwise, however slight, is sufficient to spread the conidia all round; and thus, from a single plant, a whole field may be infected in a very short time. But the whole plant becomes filled with the mycelium, alike in leaves, stems, and branches; and the tubers also become infected, both in this way, and by the entrance of mycelium tubes emitted by zoospores, washed down upon them if they lie near the surface of the soil. In whatever way the mycelium reaches the tuber, the latter becomes rotten, in patches or entirely; and, on careful

Phytophthora—*continued.*

examination, the starch grains are found to be dissolved and fissured. Where the tuber has not passed beyond the first stage of disease, it shows little sign of injury externally; and such tubers are often used for planting for next year's crop, with the frequent result of diseased plants growing from them. So far it may be said that all mycologists are agreed in regard to the development of this Fungus; but what remains to be stated here is still hotly discussed. Globular cells, three or four times the diameter of the mycelium, possessing a thick, warty outer coat, and a thin inner one, were observed in diseased potatoes, even as early as 1845. Mr. W. G. Smith has found such bodies very abundantly in old potatoes, and in diseased leaves kept in a vessel over water (*i.e.*, in moist air); and has observed, in regard to them, a process of development like that in *Peronospora nivea*, &c.; and he asserts that these brown, globular cells are the resting-spores of the Potato-disease Fungus. This is denied by Prof. De Bary, of Strasbourg, and by others. Mr. A. S. Wilson has brought forward a theory, with reasons in support of it, connecting with the Potato-disease Fungus numerous small, oval bodies (that are white by reflected, and dark by transmitted, light), which are very abundantly scattered through the tissues of Potato-leaves, &c. He and Mr. Smith believe that they have traced these small bodies into actual connection with the undoubted mycelium of *P. infestans*. The bodies, on analysis, are found to consist largely of particles of oxalate of lime, with a basis of protoplasm. Mr. Wilson regards them as a resting condition, analogous to the sclerotia of other Fungi, *e.g.*, that of *Peziza postuma*, in its uses to the *Phytophthora*. The true nature of the bodies has been hotly discussed in the "Gardeners' Chronicle" during the years 1883-85. Mr. Wilson regards Potatoes as almost all infected throughout their tissues by these resting masses of the Fungus, which, he considers, emit mycelium, and give rise to disease, under conditions favourable to the growth of the Fungus. Much has been written on remedies for the Potato disease; yet it can hardly be said that any methods have been discovered really efficient in securing the Potato crop against this scourge. Beyond doubt, the unnatural conditions induced by continuous cultivation and propagation from the tubers, have rendered the plants a more easy prey to the Fungus, and more liable to suffer severely from its attacks, than uncultivated plants would be; and this is seen if the effects on the Potato are contrasted with those on the Bitter-sweet, a plant also occasionally attacked by the Fungus. Prevention is best promoted by selecting, as seed tubers, varieties known to resist disease, since some are much hardier than others in this respect. The soil should be well drained, and there should be free circulation of air around the plants, to promote evaporation, sir moisture, confined air, and warmth, promote the rapid wth of the Fungus. The seed tubers should be planted uncut, or the cut surfaces should be allowed to heal, or may be seared with a hot iron, or otherwise coated over, before being put into the soil. All tubers that show traces of disease, and all dead stalks, leaves, &c., should be burned, to prevent the propagation of the disease through them. Of recent years, Mr. Jensen, of Copenhagen, has strongly advocated "protective moulding," and his views have been stated and supported at some length by Mr. C. B. Plowright, in the "Gardeners' Chronicle." The system was also suggested by Dr. Lang, in 1858; but it has not been generally adopted. Mr. Jensen's method may be briefly summarised as follows: The ground should be thoroughly worked and quite friable, and the potatoes should be planted in rows about 30in. high, and flat on top. The protective moulding should be done as soon as diseased spots appear on the plants, and, in any case, should not

Phytophthora—*continued.*

be deferred later than the time of Wheat-harvest: it is effected, on a small scale, in gardens, by the use of a hoe; on a large scale, in fields, by a specially-formed plough. The layer of earth should be, when it has settled down, not less than 4in. thick along each side of the row, above the tubers. At the same time, the tops should be bent over to one side of the row, and allowed to wither; and they may then be cut off and removed. The tubers may be lifted in about a week after the removal of the tops. This system proceeds on the belief that the tubers are infected by conidia and zoospores washed by showers from the leaves and through the soil on to the tubers, and not by mycelium through the stalk. Mr. Jensen also recommends disinfecting the seed tubers by storing them for four or five hours in a dry-air chamber, at a temperature of from 100deg. to 105deg. Fahr. Of course, other host-plants of the Fungus, whether wild or cultivated, ought not to be grown in the neighbourhood of Potatoes. Attempts have been made to substitute some other species of tuber-forming *Solanum* for *S. tuberosum*, but without great success. The most promising seem to be *S. Commersoni* and *S. Maglia*, the former of which appears to be uninjured by *P. infestans*.

PHYTOPTUS. *See* **Mites.**

PHYTOXIS (of Sprengel). A synonym of **Sphacele** (which *see*).

PIARANTHUS (from *piaros*, fat, and *anthos*, a flower; alluding to the shape of the blossoms). ORD. *Asclepiadeæ*. A genus comprising, perhaps, half-a-dozen species of greenhouse succulents, with low, deeply four-jointed stems, natives of South Africa. Flowers mediocre, often fasciculate; calyx small, five-parted; corolla campanulate, deeply five-cut, the lobes narrow, acuminate, valvate; corona lobes five, inflexed. The species have the general habit of **Stapelia** (which *see* for culture).

P. pullus (dark-flowered). *fl.* three or four together; corolla dark purple, the segments lanceolate, silky above, replicate. August. Branches usually hexagonal, erect; angles a little sinuated, having strong, spreading teeth. *h.* 6in. 1774. (B. M. 1648.)

P. geminatus (twin). The correct name of plant described in this work as *Podanthes geminata*.

PICEA (from *pix*, pitch; the trees produce abundance of resin). Silver Fir. SYN. *Abies* (of Don). Including *Veitchia*. ORD. *Coniferæ*. A genus comprising about a dozen species of mostly hardy, evergreen trees, inhabiting the extra-tropical regions of the Northern hemisphere. Flowers monœcious. Leaves acicular, spirally scattered, with the midrib prominently quadrigonal or sub-terete, contracted into a very short, articulated, persistent petiole. Cones ovoid or oblong-cylindrical, erect or horizontally spreading; the bracts not falling away from the axis at maturity, as in *Abies*. Owing to a succession of blunders in works treating on Conifers, the generic names *Abies* and *Picea* are generally transposed. For culture, *see* **Abies.**

P. ajanensis (Ajona). *shoots* glabrous when young, yellowish-brown, marked with oblong, smooth, prominent cushions. *l.*, those on the side shoots in many rows, but twisted at the base so as to be all in the same horizontal plane; on the upper surface of the branch appressed, parallel in direction to the branch; all flattish, linear-oblong, rather obtuse, not spine-tipped; upper surface three-ribbed; underneath, one-ribbed. *cones* erect, 1in. to 2in. long, ⅜in. broad, oblong, tapering to each end; scales shining-brown, oblong-ovate. *h.* 70ft. to 80ft. Japan, 1861. A beautiful Fir, resembling *P. excelsa*, but more elegant. SYN. *Abies Alcoquiana*, of gardens. (B. M. 6743; G. C. n. s., xviii. 183.)

P. alba (white).* White Spruce. *young shoots* very glaucous. *l.* less numerous, longer, and more pointed than in other species, somewhat glaucous, scattered around the branches, erect, quadrangular. *cones* oblong-cylindrical, light brown, small when ripe; scales loose and thin, round or bluntly pointed, with entire edges. *h.* 30ft. to 40ft. Canada, &c., 1700. (F. d. S. 2251.)

P. Alcoquiana (Alcock's).* *young shoots* covered with long, weak hairs. *l.*, those on the leader shoots appressed; on the lateral, given off on all sides; all rigid, more or less curved, linear-

Picea—*continued.*

oblong, four-sided, flattened at the top. *cones* deflexed, 2in. to 3in. in length, oblong, tapering to both ends; scales shining oblong-ovate. *h.* 90ft. to 120ft. Japan, 1861. A fine pyramidal tree. (G. C. n. s., xiii. 212.)

P. communis (common). A synonym of *P. excelsa.*

FIG. 144. PICEA EXCELSA.

P. Engelmanni (Engelmann's).* *l.*, in young plants, numerous, stout, rigid, acute, slightly recurved, deep green, more distinctly quadrangular than those of any other American species. *cones* 2in. to 2½in. long. *h.* 80ft. to 100ft. Rocky Mountains, 1864. A stately tree.

P. E. glauca (glaucous). A beautiful glaucous, silvery variety, very handsome and attractive.

FIG. 145. PICEA EXCELSA, showing (1) Fruiting Branch, (2) Scale with Seeds in position, and (3) Seed.

P. excelsa (tall).* Burgundy Pitch-tree; Norway Spruce Fir. *l.* scattered, quadrangular. *cones* cylindrical, terminal, pendent, 5in. to 7in. long, 1¼in. to 2in. broad; scales naked, truncate at the summit, flat, 1in. to 1½in. long, and about ½in. broad. North of Europe, particularly Norway, 1548. A well-known, lofty tree. SYN. *P. communis.* See Figs. 144 and 145. The varieties are very numerous, the most important being the following:

P. e. attenuata (thin-leaved). A slender-growing form, with small and thinly-set leaves, which lie close to the branches. SYN. *P. e. tenuifolia.*

Picea—*continued.*

P. e. aurea (golden). A striking form, with long, curved, glaucous green leaves, which are tipped with gold.

P. e. Clanbrasiliana (Lord Clanbrasil's).* A very dwarf, dense, slow-growing shrub, rarely exceeding 4ft. high. A more erect-growing form of this variety is known as *stricta.*

P. e. elegans (elegant). *l.* more erect than in the type. *h.* 5ft. to 6ft. A compact, dwarf, and slow-growing bush, with short branches.

P. e. eremita (solitary). Very like *P. e. monstrosa*, but having shorter and thicker branches. Bark reddish. SYN. *P. miniata.*

P. e. Finedonensis (Finedon). *l.*, young ones on the upper side of the shoots, and the wood also, at first of a pale yellow, changing to a bronzy-brown, and, when fully matured, to a light green; those on the under side, and where shaded, more or less green from the first.

P. e. Gregoryi (Gregory's). A densely-branched, conical, slow-growing bush, of a bright green hue.

P. e. horizontalis (horizontal). A variety with a horizontal habit, and more curious than beautiful.

P. e. inverta (pendulous-branched). A very elegant weeping form, of free growth. *h.* 50ft. to 80ft.

P. e. monstrosa (monstrous). A curious variety, with elongated, straggling branches, very sparsely furnished with lateral growths.

P. e. nana (dwarf). A synonym of *P. e. pygmæa.*

P. e. pumila glauca (low-growing, glaucous). *l.* nearly erect on the branches. A very dwarf, spreading, slow-growing variety; very distinct and pretty.

P. e. pygmæa (pigmy). A diminutive variety, of a pyramidal shape. *h.* 1ft. SYN. *P. e. nana.*

P. e. pyramidalis (pyramidal). A dwarf, conical, slow-growing variety, suitable for rockwork.

P. e. tenuifolia (narrow-leaved). A synonym of *P. e. attenuata.*

P. e. variegata (variegated). A form with yellow, but somewhat inconstant, variegation.

P. Glehnii (Glehn's). *l.* crowded, in many rows, curved, linear, four-sided, sharply pointed. *cones* linear-oblong, 1in. to 2in. long, ½in. to nearly 1in. wide; scales leathery, slightly striated, wedge-shaped, upper free portion rounded, denticulate, longer than the broadly lanceolate, denticulate bracts. Japan, 1880. A dwarf, dense-growing tree. (J. L. S. xviii. 513.)

P. jezoensis (Yesso). *l.* linear, close set, and arranged spirally around the stem, sharp-pointed, with a prominent midrib on both sides. *cones* cylindrical, 2in. to 2½in. long, 1in. in diameter, obtuse both at base and apex, pendulous, terminal; scales undulated, irregularly toothed at the free edge. *h.* 100ft. to 120ft. Japan, 1879. A tall, fast-growing tree. (G. C. 1880, 311.)

P. Maximowiczii (Maximowicz's). *l.* rigid, acute, erect, ½in. long, dark green. A species that does not thrive in this climate, presenting, according to Messrs. Veitch, very miserable-looking specimens, and, therefore, not recommended. (G. C. n. s., xiii. 353.)

P. Menziesii (Menzies').* *l.* linear, mucronate, incurved, turned in every direction, resupinate from being twisted at the base, silvery beneath, 2in. long, rigid, acute. *cones* pendulous, cylindrical, generally 3in. long, and about 1in. broad; scales with a dry, shrivelled appearance, gnawed on the margin, about ⅜in. long, ⅝in. broad. *h.* 50ft. to 70ft. North California, 1831. A tall tree, with regularly whorled, somewhat stiff branches.

P. miniata (red-branched). A synonym of *P. excelsa eremita.*

P. Morinda (Morinda). A synonym of *P. Smithiana.*

P. nigra (black). Black Spruce. *l.* solitary, regularly disposed all round the branches, erect, ½in. long, somewhat quadrangular. *cones* cylindrical, 1½in. to nearly 2in. long, and nearly 1in. broad, blackish-purple; scales rounded, somewhat undulated, with crenulated or divided apices. *h.* 50ft. to 80ft. North America, 1700. The branches of the Black Spruce are drooping, and the tree is more useful for economic than ornamental purposes.

P. obovata (reversed-egg-coned). This species is said to resemble *P. excelsa*, but, owing to its very early growth, is unsuitable for cultivating in England. Siberia.

P. Omorika (Omorika). *l.* flattish, straight or curved, linear-oblong, obtuse, ½in. to ⅝in. long, shining green beneath; the upper side with a prominent midrib. *cones* Larch-like, 1⅜in. long, ⅝in. thick. Buds ovoid, clothed with ovate-lanceolate scales. Servia, 1884. A tall and distinct Fir. (G. C. n. s., xxi. 308-9.)

P. orientalis (Eastern).* *l.* solitary, acute, sub-quadrangular. *cones* sub-cylindrical, pointed at the apex, 3in. long; scales broader than long, slightly angular-ovate, rounded at the apex, sub-entire. Taurus and Caucasus, 1825. A somewhat dense-growing, lofty tree

Picea—*continued.*

P. Schrenkiana (Schrenk's). A tall tree, considered to be a variety of *P. obovata*, found on the Altai Mountains, but not become acclimatised in Britain.

P. Smithiana (Smith's).* *l.* compressed, tetragonal, straight, awl-shaped, acutely pointed, 1in. to 1½in. long, scattered in insertion. *cones* ovate-oblong, 6in. long, 2½in. broad; scales obovate, roundish, coriaceous, rigid, smooth on the margin. *h.* 80ft. to 120ft. Himalayan Mountains, 1818. A well-known, very noble, and beautiful Spruce Fir, succeeding best when planted at great elevations, or on cold, late soils. SYN. *P. Morinda.* See Fig. 146.

P. Tsuga (Tsuga). *See* **Tsuga Sieboldii.**

Pick, Common—*continued.*

walks, land, &c. It is provided with an eye in the centre, through which the handle passes; both ends of the Pick are pointed alike, and curve slightly inwards, towards the person using it.

PICKEREL-WEED. *See* **Pontederia.**

PICKFORK. A combination draw hoe, or mattock, and a fork. It is useful for loosening soil, when the latter has become hardened by the sun, or from other causes, and also for breaking hard lumps. *See* **Hoes.**

FIG. 146. PICEA SMITHIANA.

PICEA (of Don). A synonym of *Abies.*

PICEUS. Black, changing to brownish-black.

PICKAXE. This is similar in shape to the common pick, but only one end is pointed, the other being wedge-shaped, and sharpened like an axe, to cut and remove roots, &c., when embedded in soil. The cutting part is in a line with the handle.

PICK, COMMON. A well-known garden implement, very useful for breaking up the hard surface of

PICOTEE. Picotees are only distinguished from Carnations by the markings of their flowers. The petals of a Carnation flower, other than a self, are either flaked or barred; while those of the Picotee (see Fig. 147) have a ground colour, and are edged with a second colour, which is used to separate the varieties into the divisions referred to below, according as the edging is lightly or heavily shown. The plants are propagated in the same way, and succeed under the same treatment, as Carnations; their flowers are superior, and the colours more clearly

Picotee—*continued.*

defined, when properly grown under glass, but, for ordinary purposes, the plants succeed admirably in the open air. Subjoined is a selection of Picotees from the several divisions. For details of culture, *see* **Carnation.**

FIG. 147. PICOTEE.

Heavy Purple-edged. ADMIRATION (Turner), JESSIE (Turner), LIZZIE TOMES (Dodwell), MRS. A. CHANCELLOR (Turner), MRS. SUMMERS (Simonite), MURIEL (Hewitt), NOVELTY (Matthews), PICCO (Jackson), REDBRAES, RIVAL PURPLE (Hooper), TINNIE (Dodwell), ZERLINA (Lord).

Heavy Red-edged. DR. EPPS, ENSIGN (Fellowes), J. B. BRYANT (Ingram), JOHN SMITH (Bower), LORD VALENTIA (Kirtland), LOTHAIR (Fellowes), MISS SMALL (Fellowes), MRS. BROWN (Payne), MRS. DODWELL (Turner), PICTURATA (Fellowes), PRINCESS OF WALES (Fellowes), ROBERT SCOTT (Flowdy).

Heavy Rose-edged. CONSTANCE HERON (Fellowes), EDITH DOMBRAIN (Turner), FANNY HELEN (Niven), LADY BOSTON (Fellowes), LOUISA (Addis), MISS HORNER (Lord), MRS. PAYNE (Fellowes), MRS. WEBB (Fellowes), ROYAL VISIT (Abercrombie).

Light Purple-edged. ALICE (Lord), AMY ROBSART (Dodwell), ANN LORD (Lord), BEAUTY OF CHELTENHAM (Abercrombie), CLARA PENSON (Wilmer), EVELYN (Hewitt), HER MAJESTY (Addis), MARY (Simonite), MINNIE (Lord), MRS. LANGTRY (Fellowes), NYMPH (Lord).

Light Red-edged. CLARA (Bower), GROSTEEN (Fletcher), MRS. BOWER (Bower), MRS. GORTON (Simonite), PRINCESS MARY (Fellowes), THOMAS WILLIAM (Flowdy), TOXOPHOLITE (Payne), VIOLET DOUGLAS (Simonite).

Light Rose-edged. DOROTHY (Fellowes), EMPRESS EUGÉNIE (Kirtland), ESTELLE (Fellowes), ETHEL (Fellowes), EVELYN (Fellowes), JEANETTE (Abercrombie), LADY CARINGTON (Abercrombie), LUCY (Addis), MISS GORTON (Dodwell)

Yellow-ground. FLAVIUS (Turner), MRS. COLMAN (Turner), PRINCE OF ORANGE (Perkins).

PICOTIA. A synonym of **Omphalodes** (which *see*).

PICRADENIA. A synonym of *Actinella.*

PICRIA. A synonym of **Coutoubea** (which *see*).

PICROPHLÆUM. A synonym of **Fagræa** (which *see*).

PICRORHIZA (from *pikros*, bitter, and *rhiza*, a root; in allusion to the bitterness of the root). ORD. *Scrophularineæ.* A monotypic genus, the species being a hardy, perennial, glabrous or pilose herb, the thick root of which is used in native Hindoo medicine. For culture, *see* **Wulfenia.**

P. Kurrooa (Kurroo, native name). *fl.* white or pale blue, disposed in clustered, terminal spikes, sessile in the axils of the bracts; calyx five-parted, the segments loosely imbricated;

Picrorhiza—*continued.*

corolla shorter than the calyx, with four broad, entire, erecto-patent lobes; peduncles scape-like, many-flowered, 4in. to 6in. high. August. Capsule nearly ½in. long, acuminate. *l.* sub-radical, oblong, crenate-serrate, 3in. to 4in. long, slightly wrinkled, entire at base, and gradually narrowed into a short petiole. Stem short. Himalayas, 1879.

PICTETIA (named in honour of A. Pictet, 1752-1825, a celebrated natural philosopher). ORD. *Leguminosæ.* A genus comprising half-a-dozen very glabrous, tropical American, ornamental, stove, evergreen shrubs. Flowers yellow in the axils, racemose or rarely solitary; two upper calyx lobes short, obtuse, the three lower ones acuminate; standard sub-orbiculate, keel obtuse. Pods oblong or broad-linear, stipitate, compressed, indehiscent. Leaves impari-pinnate; leaflets three to many, mucronate or pungent, entire, exstipellate; stipules often spinescent. The only two species in cultivation thrive in a compost of loam and peat. Propagation may be effected by cuttings, inserted in sand, under a glass, in heat.

P. aristata (awned). *fl.*, racemes loose, three to seven-flowered. June and July. *l.* with seven to ten pairs of obovate-orbicular, usually alternate leaflets, each leaflet ending in a long, straight, spine-like mucrone, having the lateral nerves prominent; stipules spinose, spreading. *h.* 5ft. to 10ft. St. Domingo, 1816. SYN. *Æschynomene aristata.*

P. squamata (scaly). *fl.* on distant, elongated, nearly opposite pedicels; racemes loose, three to seven-flowered. June and July. *l.*, leaflets seven to ten pairs, each ending in a long, spine-like mucrone; stipules spinose, erect. Branchlets with imbricated scales at their bases. *h.* 6ft. St. Thomas's Island, 1824. SYN. *Robinia squamata.*

PICTUS. Latin for **Painted** (which *see*).

PIDDINGTONIA. A synonym of **Pratia** (which *see*).

PIERCEA. A synonym of **Rivina** (which *see*).

PIERIS (a name applied to the Muses, from their supposed abode at Pieria, in Thessaly). ORD. *Ericaceæ.* A genus comprising about ten species of glabrous or pubescent, mostly hardy trees or shrubs, natives of the Himalayas, the Malayan Peninsula, Japan, and North-west America. Flowers white, rarely red, disposed in axillary or terminal, short or elongated racemes, shortly pedicellate, bracteate, and one or two bracteolate; calyx free, with five ovate, acute segments, persistent; corolla ovoid or cylindrical-urceolate, five-toothed, the lobes recurved; stamens ten, included. Leaves alternate, petiolate, persistent, entire or serrulate. The species best known to cultivation are described below. They require culture similar to that recommended for **Andromeda** (which *see*).

P. floribunda (bundle-flowered).* *fl.* pure white, produced in great abundance; racemes secund, axillary and terminal, forming panicles. April and May. *l.* ovate, oblong, acute, finely serrulated, adpressedly ciliated, glabrous, coriaceous. *h.* 2ft. to 6ft. United States, 1812. Shrub. SYNS. *Andromeda floribunda* (B. M. 1566 and B. R. 807) and *Leucothoë floribunda.*

P. formosa (beautiful).* *fl.* porcelain-white, disposed in terminal, branching clusters. *l.* coriaceous, green, somewhat bullate, lanceolate or oblanceolate, very finely serrated. 1881. A very beautiful evergreen shrub, hardy in the southernmost parts of England. (G. C. n. s., xv. 569.)

P. japonica (Japanese).* *fl.* white, urceolate, disposed in long, pendulous clusters. *l.* rather thick, dark green, lanceolate. Japan. Hardy shrub. (G. C. n. s., xvii. 797.) SYN. *Andromeda japonica* (B. H., 1871, 19; Gn., Nov., 1877).

P. mariana (Maryland). *fl.* white, large, nodding, in clusters from axillary, scaly buds; sepals leaf-like. May and June. *l.* deciduous, but rather coriaceous, oval or oblong, veiny, said to poison lambs and calves. *h.* 2ft. to 4ft. North America, 1736. Shrub. (B. M. 1759, under name of *Andromeda mariana ovalis.*)

P. nitida (shining). *fl.* white, red, or purple, odorous; corolla cylindrical-ovate, gibbous at base; clusters axillary, very numerous, six to twelve-flowered. March to May. *l.* ovate or oblong, entire, shining. Branches three-angled. *h.* 2ft. to 6ft. South United States, 1765. Evergreen shrub. (B. M. 1095, under name of *Andromeda coriacea.*)

P. ovalifolia (oval-leaved). *fl.* pale flesh-colour; corolla oblong, downy; pedicels unilateral, secund; racemes lateral, numerous, leafy, elongated, many-flowered. May. *l.* oval, acuminated,

Pieris—*continued.*

quite entire, 2in. to 4in. long, rounded at base, downy when young. Branches downy. *h.* 20ft. to 40ft. Nepaul, 1825. Half-hardy tree, poisonous to goats. *densiflora* is a dense-flowered variety, introduced from Assam in 1879.

P. phillyreæfolia (Phillyrea-leaved). *fl.* white; corolla ovoid; racemes solitary, axillary, loosely four to twelve-flowered. January to March. *l.* oblong or lanceolate-oblong, obtuse, glandular-serrate near the apex. Stem alternately leafy and bracted. *h.* 1ft. to 2ft. West Florida, 1842. Greenhouse or half-hardy shrub. (B. R. xxx. 36, under name of *Andromeda phillyreæfolia.*)

PIERIS. *See* **Cabbage Caterpillars.**

PIGAFETTA (name not explained by its author). ORD. *Palmæ.* A genus comprising three species of tall palms, with robust trunks prickly above, natives of the Malayan Archipelago and New Guinea. Flowers polygamo-monœcious, spirally disposed; spadices paniculately much branched, the peduncle and primary branches forming a tubular, incomplete spathe. Fruit globose or oblong, one-valved, one-seeded. Leaves terminal, pinnatisect; segments opposite and alternate, lanceolate, acuminate, with the margins recurved at base; petioles slightly terete, unarmed or prickly. *P. elata*, the only species in cultivation, is a very elegant palm. It requires culture similar to **Metroxylon** (which *see*).

P. elata (tall). *fl.*, spadices long, with pendulous branches. *fr.* globose, with a solitary, depressed, blackish seed. *l.* spreading and drooping, very similar to those of *Cocos*; petioles thick, with long bristles, which become spiny with age. Trunk of very hard wood, erect, simple, naked, annulate. Celebes. SYNS. *Hyospathe elata* (of gardens), *Metroxylon elatum.*

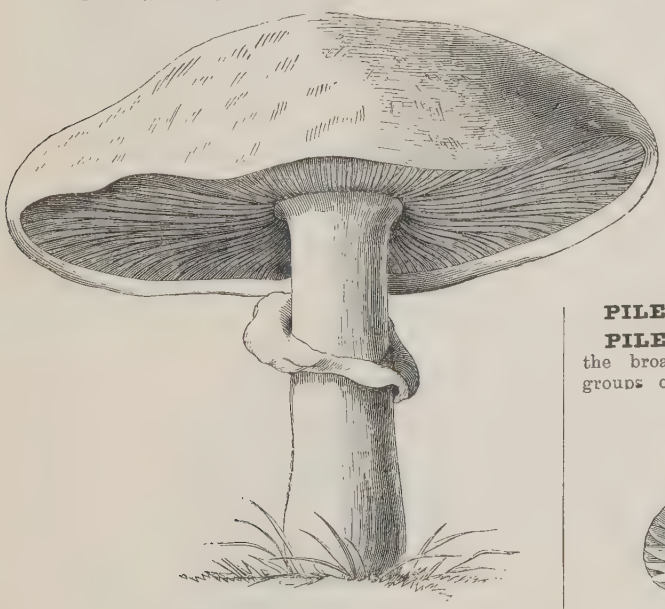


FIG. 148. MUSHROOM (*Agaricus campestris*), showing Regular Convex Pileus.

PIGEON BERRY. *See* **Phytolacca decandra.**

PIGEON PEA. *See* **Cajanus indicus.**

PIG-NUT. A common name of **Carya porcina** (which *see*).

PIG-ROOT. *See* **Sisyrinchium.**

PILEA (from *pilos*, a cap; alluding to the shape of one of the perianth segments). Stingless Nettle. SYNS. *Adike*, *Dubreuilia.* ORD. *Urticaceæ.* An extensive genus (about 160 species) of stove, annual or perennial herbs, rarely shrubby at base, sometimes creeping or diffuse, broadly scattered over the tropics, but not found in Australia. Flowers monœcious or dioecious; male perianth of four.

Pilea—*continued.*

rarely two or three, and female of three, segments; cymes solitary in the axils, sometimes densely capituliform, sometimes loosely paniculate-branched, sessile or pedunculate. Leaves opposite, entire or toothed, three-nerved or nerveless. The species are mostly weeds. The one most commonly grown is *P. microphylla*, which, as well as the others described, is West Indian and Tropical American, and thrives in a compost of loam and leaf mould. Propagated by seeds, by cuttings, or by divisions.

P. microphylla (small-leaved).* Artillery or Pistol Plant. *fl.*, cymes sub-sessile, contracted. Summer. *l.* obovate, quite entire, with a bluntish point, minute. Stem much-branched, herbaceous. *h.* 6in. 1793. SYN. *P. muscosa.*

P. muscosa (musky). A synonym of *P. microphylla.*

P. pubescens (downy). *fl.*, cymes corymbiform-paniculate, often 3in. in diameter, long-peduncled. *l.* large, ovate, pointed or bluntish at the top, coarsely serrate, entire at base, three-nerved, 2in. to 3in. long. Stem herbaceous, with branches 8in. to 12in. long. SYN. *Urtica involucrata* (B. M. 2481).

P. reticulata (netted). *fl.*, spikes axillary, simple, rarely branched, often leafy at top. *l.* opposite, rarely alternate, ovate or oblong-lanceolate, acuminate, crenate-serrate, 3in. to 6in. long. Stem 2ft. to 3ft. high, suffrutescent or herbaceous. 1793. SYN. *Urtica reticulata.* (B. M. 2567.)

PILEANTHUS (from *pilos*, a cap, and *anthos*, a flower; in allusion to the flower being inclosed in a one-leaved involucre). ORD. *Myrtaceæ.* A genus comprising two or three species of greenhouse, evergreen, Heath-like shrubs, glabrous except the flowers, and limited to West Australia. Flowers in the upper axils, forming leafy corymbs; calyx tube turbinate or campanulate; lobes ten, spreading, petal-like, entire; petals five, exceeding the calyx, spreading, shortly ciliated; bracteoles scarious, inclosing the bud. Leaves mostly opposite, linear-terete or triquetrous. The under-mentioned species requires culture similar to **Calythrix** (which *see*).

P. limacis (Limax-like). *fl.* white, on pedicels shorter than, or slightly exceeding, the leaves; calyx tube silky-pubescent. April. *l.* linear-clavate, semi-terete, very obtuse, nearly ¼in. long, smooth or glandular-tuberculate and slightly ciliated. *h.* 2ft. to 3ft. 1824.

PILEATE. Cap-like; having a pileus.

PILEUS (from *pileus*, a cap). The name given to the broad, expanded part in Mushrooms and allied groups of the larger Fungi. It is very frequently,

FIG. 149. MARASMIUS OREADES, showing Umbonate Pileus.

e.g., in the common Mushroom, shaped like an inverted saucer, or a shallow skull-cap (see Fig. 148), but shows a considerable diversity of shape in different

Pileus—*continued.*

species; *e.g.*, in *Marasmius oreades* (see Fig. 149) and *Hydnum repandum* (see Fig. 150). It is usually fixed by the middle of its lower surface, as in all the examples quoted, to the stop of a stalk; but in a good many Fungi that possess a Pileus, the stalk is fixed to one side (*e.g.*, in many species of *Polyporus*), and others want it altogether. The upper surface of the Pileus is usually covered with a skin or coat, which in many species is slimy, but in some is scaly, in others hairy, &c. The Pileus bears generally, on its lower surface, the spore-producing surface, or hymenium — in some genera, in the form of gills; in others, like tubes or fleshy teeth (*see* **Mushrooms**). The Pileus and stalk together form the hymenophore.

FIG. 150. HYDNUM REPANDUM, showing Irregular Flattish Pileus.

PILEWORT. *See* **Ranunculus Ficaria.**

PILI. Hairs.

PILIFEROUS. Tipped with, or bearing, hairs.

PILLWORT. *See* **Pilularia.**

PILOCARPUS from *pilos*, a cap, and *karpos*, a fruit; referring to the shape of the berries). ORD. *Rutaceæ*. A genus comprising about five species of stove shrubs, natives of tropical America and the West Indies. Flowers green or purple, gland-dotted; calyx short, almost entire, or four or five-toothed; petals four or five, triangular; racemes or spikes simple, terminal or axillary. Leaves petiolate, opposite or alternate, or ternately whorled, one to three-foliolate or impari-pinnate, coriaceous or membranous, entire, pellucid-dotted. For culture, *see* **Chloroxylon.**

P. pennatifolius (feather-leaved). *fl.* purple, in crowded racemes, 18in. long; petals thick, lanceolate. *l.* alternate, impari-pinnate: leaflets two or three-jugate, elliptic or oblanceolate, the margins obsoletely revolute, pellucid-dotted. *h.* 6ft. Brazil. (B. M. Pl. 48; L. J. F. iii. 263.) This is one of the plants which furnishe the Jaborandi of commerce, an energetic diaphoretic and sialogogue.

PILOCEREUS (from *pilos*, wool, and *Cereus*; referring to the long hairs upon the spine-cushions).

Pilocereus—*continued.*

ORD. *Cacteæ*. A small genus of greenhouse succulents, now included, by Bentham and Hooker, under *Cereus*; the principal differences consist in the flower-bearing portion of the plant being unlike the rest, usually forming a dense, woolly head at the summit of the stem, and having more numerous, longer and thinner, often hair-like spines, and the flowers themselves being smaller, and having fewer divisions, with the stamens attached to the whole surface of the tube. The species very rarely produce flowers in cultivation. For culture, *see* **Cactus.**

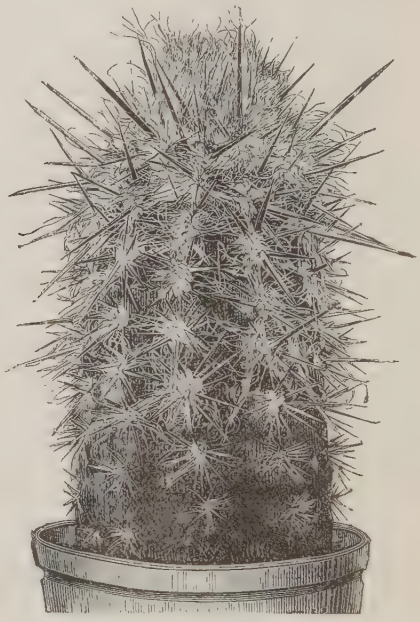


FIG. 151. PILOCEREUS BRUNNOWII.

FIG. 152. PILOCEREUS DAUTWITZII.

Pilocereus—*continued.*

P. Brunnowii (Brunnow's). *fl.* unknown. Stem erect, cylindrical, many ribbed, bright green, thickly beset with shining spots; ribs nine to twelve, vertical, rounded, uneven when young, later on pretty smooth. Prickles about thirteen, central one much the longest, surrounded in the younger parts of the plant by long white hairs. Bolivia, 1870. See Fig. 151 (for which, as well as for Fig. 152, we are indebted to Herr Fr. Ad. Haage, jun., of Erfurt).

P. Curtisii (Curtis'). *fl.*, tube olive-green, 2in. long, ¾in. thick, expanding with many imbricating segments; within this is a series of pale rose-coloured, ovate petals; style deep rose-colour; stigma of seven or eight rays. Spring and summer. Plant 3ft. or more high, 1½in. to 2in. in diameter, erect, straight or somewhat flexuous, eight to ten-angled, beset with little tufts of wool; from these arise a spreading cluster of aculei, and from a tuft of this description springs the flower. Grenada. SYN. *Cereus Royeni.* (B. M. 3125.)

P. Dautwitzii (Dautwitz's).* Stem oblong or fusiform, bright green; traversed from base to apex by twenty-one shallow ribs, bearing closely-set tufts of small, white, spreading straight spines, and covered throughout, but more especially at the top, with a dense coating of long, white, cottony hair. Northern Peru, 1870. See Fig. 152.

P. fossulatus (grooved). Stem erect, club-shaped, with ten to twelve obtuse angles; sutures undulated, with a depression above each areole; spines pale brown, the central one very strong, 1in. long, the outer ones ten to twelve, depressed; hairs white, very strong, with a tuft on the apex. *h.* probably 20ft. A noble and very distinct, but scarce species. Peru (?). (G. C. 1873, 197.)

P. Houlletii (Houllet's).* *fl.* a kind of violet, with a suspicion of rose and yellow; segments very small, numerous, lanceolate, recurved; tube short, smooth, with a few pointed, reddish-green scales. Stem strong, grey-green; ribs seven or eight; prickles nine, straw-coloured, central one longest. The younger parts of the plant are covered with a white felt. See Fig. 153. (R. H. 1862, 427.)

P. senilis (aged).* Old Man Cactus. "A cylindrical-stemmed plant, 1ft. or more in height; but in Mexico, its native country, it attains a height of 20ft. to 25ft., with a diameter of 9in. or 10in., and its fluted character gives it somewhat the appearance of an architectural column. The stem is divided into thirty or forty narrow furrows, with corresponding ridges, which are furnished, at very short distances, with tufts of white spines, surrounded by numerous long, flexible, white hairs, resembling the grey hairs of an old man's head. . . . . When young, the stems are fleshy and succulent, but, as they get old, their tissue becomes filled with an extraordinary quantity of small, sand-like grains, composed of oxalate of lime, not less than from 60 to 80 per cent. having been found in individual stems" ("Treasury of Botany"). Mexico and Guatemala.

FIG. 153. UPPER PORTION OF PLANT OF PILOCEREUS HOULLETII, with Bud and Fruit (natural size).

PILOPHORA. A synonym of **Manicaria** (which *see*).

PILOSE. Covered with long, soft hairs; having the form of hairs.

PILOSELLA. Included under *Hieracium.*

PILOSIUSCULUS. Slightly hairy.

PILULARIA (from *pilula*, a little ball or pill; alluding to the shape of the heads containing the reproductive organs). Pillwort. ORD. *Marsileaceæ.* A small genus (three species) of obscure little aquatic plants, inhabiting temperate Europe, Western Asia, Australia, and North America. Rootstock creeping under water. Leaves solitary, erect, setaceous. "Capsule globose, two to four-celled, two to four-valved at the top; cells each with a longitudinal, parietal placenta, on which are inserted many pyriform, membranous sacs; sacs in the upper part of the cell full of microspores immersed in mucilage; those in the lower part contain each one macrospore. Microspores globular, full of antherozoids. Macrospores ovoid, with an outer coat of prismatic cells, pierced by a funnel-shaped opening, through which an inner, glassy coat finally protrudes. In germination, a prothallus is developed at the top of the protruded portion of the inner coat of the macrospore, which bursts and frees it. After expulsion, an archegonium is formed on the prothallus, and fertilisation takes place by the contents of the microspore" (Hooker). *P. globulifera* is found in damp meadows, among grass, especially where they have been overflowed with water during winter; it is widely distributed over England and Scotland, but

Pilularia—*continued.*

very rare in Ireland. It is of more botanical than horticultural interest.

P. globulifera (globule-bearing). *rootstock* slender, often creeping to a considerable length, and rooting at every node. *l.* bright green, varying from 1in. to 4in. in length. Capsules pill-like, about ⅛in. in diameter, covered with short hairs. *h.* 3in. (F. D. ii. 223.)

PILUMNA. A synonym of **Trichopilia** (which *see*).

PIMELEA (from *pimele*, fat; alluding to the oily seeds). Rice Flower. SYNS. *Banksia* (of Forster), *Cookia*. ORD. *Thymelæaceæ*. A large genus (seventy-six species have been described) of beautiful, greenhouse trees, shrubs, or rarely herbs, natives of Australia and New Zealand. Flowers hermaphrodite or rarely dicœcious, capitate-spicate or fascicled, terminal or axillary, very rarely solitary; perianth with a cylindrical tube, and four spreading or rarely erect lobes; stamens two, affixed to the throat. Leaves opposite or scattered, usually rather small. Most of the species which have been introduced are described below; except where otherwise stated, they are shrubs, and inhabitants of Australia.

Pimeleas are compact, free-growing, and very desirable greenhouse plants, especially as they flower when most of the other hard-wooded representatives are past. Their flower-heads are borne in the greatest profusion on the points of shoots that are made annually, those of one season flowering in that next following. The plants succeed in good fibrous peat and silver sand, or they may be grown as stronger specimens with loam instead of peat, if it is of good quality, and contains plenty of fibre. Cuttings, made of the young shoots, when they are about 2in. long, will root, if inserted, in spring, in a compost of one part peat to two of silver sand, and covered with a bell glass. They should be placed in an intermediate house, kept moist, and shaded from sunshine. When roots are formed, gradually admit air, and, in due course, pot off singly, and grow the plants on in a close, moist atmosphere until established, when a more airy situation will be best. Established flowering plants of Pimeleas may be treated somewhat like others of a hard-wooded description, except that they require rather more water and syringing. They are more than usually susceptible to the attacks of Red Spider, and, if this is allowed a footing, much injury will ensue. Pimelias may also be raised from imported seeds, when these are obtainable; young plants flower when they are very small, if allowed, but this is not advisable, as it tends to unduly weaken them. The habit assumed is such as to require but little training beyond stopping shoots on young plants that are inclined to take a lead. Each year, after flowering, all the heads should be cut over, and any necessary repotting attended to so soon as the new growth has commenced. The most beautiful species is *P. spectabilis*; others specially noteworthy are *P. ferruginea*, and *P. ligustrina hypericina*. The first-named and the last will grow into large specimens if desired; *P. ferruginea* is of a much more dwarf and compact habit.

P. arenaria (sand-loving). *fl.* white, villous or shaggy. May. *l.* close-set, but not imbricated, ¼in. to ½in. long, oblong or orbicular, pilose above, silky and shining beneath. Branches stout, densely villous. *h.* 8in. to 24in. New Zealand, 1827. A very beautiful little shrub. (B. M. 3270.)

P. crinita (hairy). A synonym of *P. imbricata piligera.*

P. decussata (decussate). A synonym of *P. ferruginea.*

P. diosmifolia (Diosma-leaved), of Loddiges. A synonym of *P. ferruginea.*

P. drupacea (drupe-bearing). Victorian Bird Cherry. *fl.* white, tinged with pink, small, not numerous; heads terminal on young shoots, but mostly appearing axillary and sessile from the extreme shortness of the flowering branches. May. *fr.* a drupe, red or black when ripe. *l.* all opposite, ovate to oblong-elliptic or oblong-linear, ¾in. to 2in. long, glabrous above, pale and often silky beneath. *h.* 2ft. to 6ft. 1817. (L. B. C. 540; S. F. A. 2.)

Pimelea—*continued.*

P. elegans (elegant). A synonym of *P. ligustrina hypericina.*

P. ferruginea (rusty).* *fl.* rose or red, in terminal, globular heads. May. *l.* opposite, usually crowded, sessile, ovate or oblong, obtuse, or scarcely mucronate, ¼in. to ⅜in. long. *h.* 1ft. to 2ft. 1824. SYNS. *P. decussata* (B. 136; L. B. C. 1283; S. F. A. 8), *P. diosmifolia* (L. B. C. 1708).

P. filamentosa (thread-like). A synonym of *P. linifolia.*

P. glauca (glaucous). *fl.* white; perianth nearly ½in. long; heads globular; involucral bracts usually four. June. *l.* opposite, from ovate to oblong-lanceolate or almost linear, sometimes all under ¼in., sometimes ½in. to ¾in. or more long, flat or concave. *h.* 6in. to 18in. 1824. (L. B. C. 1611; T. L. S. x. 13.) SYNS. *P. humilis* (B. R. 1268), *P. intermedia* (B. 243; B. R. 1439).

P. Gnidia (Gnidia). *fl.* red, silky and villous. Early summer. *l.* crowded, shining above, petioled, ½in. to ¾in. long, oblong or oblong-lanceolate, acute or obtuse. *h.* 1ft. to 5ft. New Zealand.

P. graciliflora (slender-flowered). A form of *P. sylvestris.*

P. Hendersoni (Henderson's). A synonym of *P. rosea.*

P. hispida (hairy).* *fl.* blush-colour, in terminal, globular heads; perianth four to seven lines long. May. *l.* opposite, varying from ovate and under ¼in. long to oblong or oblong-lanceolate and ⅜in. or more long, sessile or scarcely petiolate. *h.* 2ft. to 4ft. 1830. (B. M. 3459; B. R. 1578; L. B. C. 1966.)

P. humilis (dwarf). A synonym of *P. glauca.*

P. hypericina (Hypericum-like). A synonym of *P. ligustrina hypericina.*

P. imbricata piligera (imbricated, pili-bearing). *fl.* usually white, rather large, in globular heads, with eight or more involucral bracts. August. *l.* narrow, often ½in. long, all or mostly clothed with long, loose, silky hairs. *h.* 6in. to 18in. 1837. SYNS. *P. crinita*, *P. nana* (B. M. 3833).

P. incana (hoary). A synonym of *P. nivea.*

P. intermedia (intermediate). A synonym of *P. glauca.*

P. lanata (woolly). A synonym of *P. sericea.*

P. ligustrina (Ligustrum-like), of Bot. Reg. A synonym of *P. ligustrina hypericina.*

P. ligustrina hypericina (Ligustrum-like, Hypericum-like var.).* *fl.* white, in globular heads; involucral bracts usually six to eight, silky-pubescent or hoary. May. *l.* opposite, ovate to oblong or elliptical, 1in. to 1½in. long, or on luxuriant shoots twice that size. *h.* 5ft. to 6ft. 1823. See Fig. 154. SYNS. *P. elegans* (I. H. viii. 295), *P. hypericina* (B. M. 3330), *P. ligustrina* (B. R. 1827).

P. linifolia (Flax-leaved). *fl.* white, in terminal, globular heads; involucral bracts four. May. *l.* opposite, on very short petioles, linear or oblong, passing into linear-spathulate or linear-lanceolate, from less than ½in. to about 1in. long. Branches usually slender and twiggy. *h.* 1ft. to 3ft. 1793. (B. M. 891; L. B. C. 1668.) SYNS. *P. filamentosa* (T. L. S. x. 14), *P. linoides*, *P. paludosa.*

P. linoides (Flax-like). A synonym of *P. linifolia.*

P. longiflora (long-flowered). *fl.* white, in globular heads, with five to eight involucral bracts. June. *l.* mostly alternate, linear, concave, from ½in. to above ½in. long, and usually erect. *h.* 1ft. to 4ft. 1831. (B. M. 3281.)

P. macrocephala (large-headed). A synonym of *P. suaveolens.*

P. nana (dwarf). A synonym of *P. imbricata piligera.*

P. Neypergiana (Neyperg's). A garden synonym of *P. Preissii.*

P. nivea (snowy). *fl.* white, in terminal, globular heads; involucral bracts four to six, rather larger than the cauline leaves June. *l.* opposite, ovate or orbicular, rarely broadly elliptic-oblong, less than ¼in. long, rather thick, with recurved margins, and beneath, as well as the branches, white with tomentum. *h.* 4ft. 1833. SYN. *P. incana* (B. 147; B. R. 1838, 24).

P. paludosa (marsh-loving). A synonym of *P. linifolia.*

P. paucifiora (few-flowered). *fl.* white, few in the head. May. *l.* opposite, linear-lanceolate, acute or obtuse, mostly ¼in. to 1in. long, or, on some luxuriant shoots, narrow, and 1½in. long, flat or concave. *h.* 3ft. to 10ft. 1812. (L. B. C. 179.)

P. Preissii (Preiss'). *fl.* in globular heads, with four to six involucral bracts. April. *l.* opposite, linear-lanceolate or oblong-linear, slightly concave, ¼in. to above ½in. long. *h.* 1ft. to 2ft. 1846. SYN. *P. Neypergiana*, of gardens.

P. rosea (rose-coloured).* *fl.* pink or white, similar to those of *P. ferruginea*, but larger. June. *l.* opposite, linear or linear-oblong, often above ½in. long, with the recurved or revolute margins of the species just named. 1800. Allied to *P. ferruginea*, but taller and more slender. (B. M. 1458; L. B. C. 88.) SYN. *P. Hendersoni* (B. M. 3721).

P. sericea (silky). *fl.* in terminal heads; involucral bracts four to six, rather larger than the stem leaves. May. *l.* opposite, crowded, ovate or oblong, less than ½in. long, glabrous above. *h.* 1ft. to 2ft. 1834. This resembles *P. nivea*, but it may be "readily known by the dense indumentum of the branches and under side of the leaves consisting of silvery-silky hairs" (Bentham). SYN. *P. lanata* (B. 61).

Pimelea—*continued.*

P. spectabilis (remarkable).* *fl.* white, more or less tinged with pink, in usually large, globular heads, surrounded by four to six bracts, which are often coloured on the margins. May. *l.* mostly opposite, rather crowded, linear-oblong or lanceolate, flat or with slightly recurved margins, ¾in. to 1½in. long; the upper one often broader and shorter. *h.* 3ft. to 4ft. 1840. SYN. *P. Verschaffeltii.* (B. M. 3950.)

P. suaveolens (sweet-smelling).* *fl.* yellow when fresh, in globular heads; involucral bracts four to eight, usually ciliated. April. *l.* opposite, from ovate-lanceolate to oblong-linear, more or less concave, mostly ½in. to 1in. long. *h.* 1ft. to 3ft. 1848. SYN. *P. macrocephala* (B. M. 4543; L. J. F. 76).

FIG. 154. PIMELEA LIGUSTRINA HYPERICINA.

P. sylvestris (sylvan). *fl.* blush-colour, in globular heads; involucre of four to six bracts. June. *l.* opposite, oblong or lanceolate, mostly ½in. to ¾in. long, more or less concave. *h.* 2ft. to 3ft. 1830. (B. M. 3276; B. R. 1582; L. B. C. 1965.) *P. graciliflora* (B. M. 3288) is a form with broader leaves.

P. Verschaffeltii (Verschaffelt's). A synonym of *P. spectabilis.*

PIMENTA (from *Pimento*, the Spanish name). All-spice-tree. ORD. *Myrtaceæ.* A genus containing five species of very fragrant, stove trees, natives of tropical America, one being also frequently found in the East Indies. Flowers small, disposed in trichotomous, many-flowered cymes in the upper axils; calyx tube turbinate or campanulate, the limb of four or five spreading lobes or segments; petals four or five, spreading; stamens many-seriate. Fruit baccate, crowned with the calyx limb. Leaves ample, coriaceous, penniveined. The under-mentioned species require culture similar to **Myrtus** (which *see*).

P. acris (acrid). Baberry-tree; Black Cinnamon; Wild Clove. *fl.* white, with a slightly reddish tinge, five-cleft; peduncles axillary and terminal, trichotomous, corymbose, compressed, longer than the leaves. May to July. Berries as large as peas, having an aromatic smell and taste. *l.* elliptic, obtuse, convex, coriaceous, glabrous, reticulate-veined above, full of very fine, pellucid dots. *h.* 20ft. to 40ft. West Indies, 1759. The berries of this tree are useful for culinary purposes; the leaves also, having a sweet, aromatic smell, and on account of their astringency, are often used in sauces. SYN. *Myrcia acris* (B. M. 3153).

P. officinalis (officinal). Pimento-bush. *fl.* white, in compound, corymb-like cymes; calyx four-lobed, the tube as long as the ovary. May to July. Fruit globose. *l.* oblong or lanceolate-oblong, glabrous; veins obsolete above, primary distant and slightly prominent beneath. Branchlets compressed, sub-tetragonal, glabrate. *h.* 2ft. Jamaica, 1793. SYNS. *P. vulgaris, Eugenia Pimenta, Myrtus Pimenta* (B. M. 1236).

P. vulgaris (common). A synonym of *P. officinalis.*

PIMENTO-BUSH. *See* **Pimenta officinalis.**

PIMPERNEL. *See* **Anagallis.** The same name is occasionally used for *Poterium Sanguisorba* and *Prunella vulgaris.*

PIMPINELLA (said to be altered from *bipinnula*, twice pinnate; in allusion to the shape of the leaves). Burnet Saxifrage. Including *Sisarum.* ORD. *Umbelliferæ.* A genus comprising about seventy species of herbs, broadly dispersed over the Northern hemisphere and South Africa, a few being also found in extra-tropical South America. Flowers white or yellow, in compound umbels; involucral bracts none, or rarely one or two. Leaves pinnate, or ternately or pinnately decompound, rarely undivided and toothed. The species are of no horticultural value. *P. magna* and *P. Saxifraga* (Burnet Saxifrage) are British plants. *P. Anisum* is the Aniseed-plant of commerce.

PINACEÆ. Included under *Coniferæ.*

PINALIA. A synonym of *Eria.*

PINANGA (a local Malayan name). ORD. *Palmæ.* A genus comprising about twenty-five species of stove palms, usually low and slender-stemmed, natives of India and the Malayan Archipelago (one is found in the Deccan). Flowers in straight lines, in whorls, or in spirals composed of few turns, the male flowers having their sepals connected at the base, and scarcely overlapping, and containing a short, rudimentary pistil, or none at all; complete spathe solitary, twined or complicate-compressed, and two-winged; spadix usually small, sometimes very simple; peduncle short. Fruit usually yellow or blood-colour, ovoid or ellipsoid, the albumen of the seeds marked like a nutmeg. Leaves terminal, unequally cut or pinnatisect, or simply bifid at the apex, not thickened at margins, recurved at base; sheaths elongated. The species known to cultivation are described below. A compost of one part loam, two of peat, and a little sand, is most suitable; and an abundant supply of water is essential. Propagated by seeds.

Pinanga—*continued.*

P. coronata (crowned). *fl.*, spadix at first erect, eventually nodding. Branches thick and rather straight; flowering ones distichous, fruiting ones coarctate-fasciculate. *fr.* ellipsoid, crowning the disk-like stigma. *l.* pinnatisect, with a glabrous rachis; segments thick, elongated, linear, acuminate, the upper ones truncately incised at the apex. Trunk 15ft. to 20ft. high. Java, 1848. SYN. *Seaforthia coronata.*

P. globosa (globose). A synonym of *Calyptrocalyx spicatus.*

P. Kuhlii (Kuhl's). *fl.*, spadix nodding, with straight, thick, fastigiate branches. *fr.* distichous, ellipsoid, obtuse, smooth. *l.* pinnatisect, with the rachis slightly scaly; segments ten to thirteen on each side, falcate-lanceolate, very acuminate, the upper ones truncately cut at the apex, and sub-equally cuneate at the base. Trunk mediocre or rather tall. Java, 1873. SYNS. *Ptychosperma Kuhlii, Seaforthia Kuhlii.*

P. latisecta (broadly cut). *fl.*, spadix long-pedunculate, erecto-patent, trifid. *fr.* (immature), according to Martius, oblong-ellipsoid, slightly acute, smooth. *l.* pinnatisect, with the rachis lepidote-punctate; segments falcate-lanceolate, very much acuminate, sometimes bifid, the terminal one very broad, truncate at apex, and incised-toothed. *h.* 15ft. Sumatra. SYN. *Seaforthia latisecta.*

P. maculata (spotted). *l.* pinnate; pinnæ broad, sessile, pendent, bright green, blotched and spotted on the upper side with dark green. Stem slender, smooth. Philippines. A beautiful and rare species. (I. H. 1863, 361.)

P. malaiana (Malayan). *fl.*, male sepals lanceolate, acuminate, one-third as long as the broadly ovate, acuminate petals; females distichous, with a large, discoid stigma; spathe solitary; spadix refracted, three to five-branched. *l.* pinnate; pinnæ almost alternate, linear-lanceolate, acuminate, glaucous beneath. Trunk 8ft. to 12ft. high. Penang and Malacca. SYN. *Seaforthia malaiana.*

P. patula (spreading). *fl.*, spadix green when in flower, red when in fruit. *fr.* orange-yellow, ellipsoid, ⅜in. long. *l.* 4ft. to 5ft. long, unequally pinnate, oblong in outline, sheathing at the base. Stem erect, 9ft. high, smooth, ringed, swollen at base. Sumatra. A beautiful, dwarf species. (B. M. 6581.)

P. ternatensis (Ternate Island). *fl.*, branches of spadix spirally disposed. *l.* 12ft. long, with thirty to forty, two-nerved, lanceolate, falciform segments, the largest of which are 3ft. long. Stem simple. SYN. *Areca gigantea*, of gardens.

P. Veitchii (Veitch's). *l.* oblong, tapering at the base, truncate, deeply two-lobed at the apex, mottled green above, with reddish nerves, rich claret-coloured beneath. Borneo, 1879. A highly ornamental species. (F. d. S. 2405-6; R. G. 1880, 264.)

PINARDIA (of Necker). A synonym of *Aster.*

PINCERS. These are requisite in gardens, for drawing nails when unpacking cases, &c. Much inconvenience is caused, and lids of boxes rendered useless, when no Pincers are at hand for use with the garden hammer.

PINCKNEYA (named after an American botanist of the name of Pinckney). SYNS. *Pinknea, Pinkneya.* ORD. *Rubiaceæ.* A monotypic genus. The species is a small tree; it is usually grown in a greenhouse, but thrives very well in the open air, against a south wall, and in a compost of loam and peat. Propagated by cuttings of the ripened shoots, inserted in sandy peat, under a handlight.

P. pubens (downy). Bitter Bark-tree. *fl.* rose, purple-spotted, rather large, pubescent, bracteolate, disposed in terminal and axillary corymbs; calyx lobes pink; corolla funnel-shaped, with a five-cleft, recurved limb, beyond which the five stamens project. Summer. *l.* ample, opposite, stalked, oval, acute at both ends, tomentose beneath, as well as the branches. Branches opposite. *h.* 20ft. Carolina to Florida, 1786. (F. d. S. 1937.) This species is more conspicuous by reason of the large, pink bracts subtending the inflorescence, than for the purple-spotted corolla.

PINCUSHION FLOWER. *See* **Scabiosa.**

PINE. *See* **Pinus.** The name is also applied to several other genera.

PINE-APPLE (*Ananas sativa*). The Pine-apple is a native of tropical America; it has also become naturalised, and grows in abundance, in some of the hot parts of Asia and Africa. It was introduced into this country about the end of the seventeenth century, and, after some thirty or forty years, the plant seems to have been cultivated for the use of its fruit. In those days, the maintenance of a temperature sufficiently high to suit the plant's requirements was far more

Pine-apple—*continued.*

difficult to accomplish than now, when suitable structures and all the modern appliances for heating are at command. Little is recorded of the success attending Pine-apple culture when first attempted; but, after the introduction of hot-water pipes, and, doubtless, also from the cultural requirements being much better understood, its cultivation, both for private consumption and for market, was, for a time, generally practised with much greater success than had hitherto been possible. Less than twenty years ago, the importation of ripe fruits, chiefly from the Azores, began in earnest, to meet the increased demand; and Pine-growing has gradually decreased in this country, the space and the attention of cultivators being devoted instead to fruits, &c., that are in more general demand, require less heat, and are not to be imported in such an excellent condition. First-class English-grown Pine-apples are still considered by many to be the finest and best in the world; but, so long as fresh, well-swelled fruits of the Smooth-leaved Cayenne variety can be imported to arrive little inferior in quality, it is more than likely that English Pine-growing will not again be practised to the extent it was previously. There are, however, still many gardens from which Pine-apples are expected in greater or less quantity; in some, the work attending their culture is rather laborious, especially where the necessary bottom-heat has to be mainly obtained from the plunging material, which generally consists of Oak-leaves or tan.

PROPAGATION. This may be accomplished by seeds, crowns, gills, cuttings of the stem or dormant buds, and suckers. Seeds may be sown in shallow pans or pots of light, sandy soil, which should be placed in a bottom heat of about 85deg. or 90deg., and covered with a bell glass. The seedlings, when they are large enough to handle, should be potted in light, peaty soil, and grown on in a high temperature until they are large enough to be treated like ordinary plants obtained by other means. Crowns are procured from the points of the fruits; they should be inserted, so soon as the fruit is used, in small pots of rather dry soil, and be plunged in a strong bottom heat. Crowns are principally utilised when the variety is rather shy in producing suckers; they do not form such good plants, nor are they considered to produce such heavy fruits, as suckers. A longer period is also required to bring them to a fruiting stage. Gills are offshoots, something like small suckers, that are produced just below the fruit. They are not often used for propagating, except in the case of rare sorts. Cuttings of the stem, or propagation from dormant eyes, is another method pursued when suckers are scarce. The leaves may be removed from the stems of plants whose fruits have been cut, when the stems should be cut in pieces, or, better still, laid intact in shallow boxes, which should be thoroughly drained. They should be covered with at least 1in. of light soil, and panes of glass should be laid over the top. If subjected to bottom heat, most of the dormant buds which were formed at the base of each leaf will, in due course, start growth as young plants. They may be removed carefully, when large enough, and treated as seedlings. Suckers afford the chief supply for effecting an increase; they are usually procurable from plants when the latter arrive at the fruiting stage. After the fruit is cut, the suckers grow fast from the base, and it is often a good practice to allow them to remain on the old stools until they attain a large size. They may be detached, and potted off singly; but it is not advisable to do this during the winter months: from March, in spring, to a period not later than September, in autumn, should be taken as a limit. In the preparation of suckers for inserting, all that is necessary is to carefully remove them, by taking hold close to the base, and twisting gently, forward and

Pine-apple—*continued.*

backward, until they come off; afterwards, cut the end smooth with a sharp knife, and take off a very few of the smallest lower leaves. Suckers may be potted, according to their size, in clean pots, from 5in. to 8in. in diameter.

CULTIVATION. Where a quantity of Pine-apples are grown, it is usual to set apart structures for those in various stages of growth — one for suckers, one for succession plants, and another for those which have advanced to the fruiting stage. In all cases, provision must be made for plunging-beds, and there should be plenty of hot-water pipes for keeping a high temperature, without having to over-heat them and produce a very dry atmosphere. Pine-apples may be grown in pits, but they may be much better attended to in a house, which, for the various stages in the growth of the plants, may be a lean-to, hip-roofed, or a span-roofed structure. Provision should always be made for the full admission of light; this is a most important element in cultivation, as it is conducive towards keeping the plants dwarf and sturdy. The surface of the plunging-beds should be near enough to the glass to allow of the plants nearly touching the latter when fixed in position. There should be hot-water pipes passing through a hollowed chamber beneath a staging of slate or wood, fixed to hold up the plants, and form a division. The plunging material above the hollowed chamber, consisting of good Oak-leaves or tan, should be from 2ft. to 3ft. deep for maintaining heat over a long period. A small lean-to house is best for propagating, with a plunging-bed along the front, and a narrow passage at the back. When the plants become too large for this structure, they will be ready for the succession house, which may be hip roofed or lean-to, on a higher and larger scale, with front and back passages. For fruiting Pine-apples, a span-roofed house is generally preferred for summer, to meet the requirements of strong-growing plants, and afford facilities for giving them an abundance of light; such an arrangement is not, however, always practicable, and the best has, consequently, to be made of the means at command.

Provision should be made, in Pine-houses or pits, for applying a thin shading for a few hours on bright summer days; but this must be fixed on rollers, and on no account be left down permanently. To these rollers a thicker covering, for use on cold nights, and in severe weather, may be fixed with great advantage, as the heat and moisture, inside the house, will be much preserved thereby, and this is of great importance when hard-firing becomes a necessity. Ventilation should chiefly be given from the top; but provision should also be made for admitting front air near where the pipes are situated, in case of such being required in summer. On hot days, if top ventilators are open, rapid evaporation of moisture takes place; this may be counteracted considerably by nearly closing the top when the shading is down, and giving air from the front instead. On no account must draughts be allowed.

The soil best suited for Pine-apples is one that affords the free passage of water, and the pots used should be thoroughly clean and dry both inside and out; they should also be well drained. Light, fibrous loam, which has been cut very thin, and stacked for a time sufficient to kill the grass, should form the main part of the compost. It should be torn up by hand, and only the rough, lumpy portions used. To it may be added some fibry peat similarly shaken out, about one-fifth part of rough, charred refuse, or some charcoal, and crushed bones, to the extent of half a bushel to about five barrow-loads of the compost. This should be prepared beforehand, and always made warm before being used. Animal manures, and anything tending to decay rapidly, should be excluded from soils intended for Pine-apple culture. If a stimulant becomes necessary, it is

Pine-apple—*continued.*

best applied when the plants require it, by means of diluted liquid manure. The chief provisions, under this heading, are, therefore, those of insuring thorough porosity in the soil, and good drainage: Pine-apples will never succeed in a compost that becomes at any time close and retentive, or in the least sour from being over-wet.

Pine-apples need never be placed in larger than 12in. pots; in these they may be most successfully fruited. In growing on suckers, and succession plants, an eye should be given to potting in sizes proportionate to giving a final shift into that above mentioned. Some cultivators adopt a system of planting-out Pine-apples when they arrive at the fruiting stage; but it is not generally practised. There are disadvantages, as, for instance, if anything should prove unfavourable to their well-being, it might not be so easily remedied as if the plants could be readily removed. A pot-plant, so soon as its fruit has been cut, may be easily taken elsewhere for producing suckers, and another, with the fruit ripening, put into its place. This would not be so readily accomplished were the system of planting-out adopted.

Watering must be conducted with great care in winter; sometimes it will not be advisable to apply any for weeks then, nor yet in early spring. When the application of water becomes necessary—a time readily known to practised cultivators by the plant's appearance—sufficient should be given to thoroughly soak the ball, and this should be of a temperature equally as high as that of the bottom heat maintained. It is well to examine the plants for watering at least once a week. Syringing, during the season when the plants are growing, should be practised at closing time in the afternoons; warm water must always be used. Evaporating troughs, on the pipes, kept filled with water, and frequent dampings of the walls and passages, will preserve a moist atmosphere; this, with a high temperature, is what Pine-apples require when growing as succession plants, and when the fruits are swelling. At the time the latter are ripening, water should be withheld, and a much drier atmosphere maintained; otherwise, the flavour will be affected.

In winter, the plants should be rested, but not subjected to a lower minimum night temperature than 65deg., that by day, in mild weather, being 5deg. or 10deg. higher. As the days lengthen, these figures may increase, until, in summer, 70deg. or 75deg. should be taken as a minimum for night. The bottom heat to be aimed at, through the spring and summer, is about 85deg.

INSECTS. Mealy Bug and White Scale are the most destructive insects to the attacks of which Pine-apples are subject. Both are very injurious, and are difficult to eradicate; it is therefore extremely important that their appearance should, if possible, be prevented. Whenever any are detected, measures for cleansing the plants should be at once taken in hand. Various remedies have been proposed and tried, amongst them being that of placing affected plants head downwards over a bed of fermenting horse-dung, in a frame which is kept closed for about an hour, when the plants are taken out and washed. Clean water, at a temperature approaching, but not exceeding, 130deg., has also been recommended. Perhaps the most efficacious remedy, when properly applied, is paraffin, using a wineglassful to a gallon of warm, soft water. The plants should be laid on their side, and the mixture syringed on by one person, while another keeps it constantly agitated with a second syringe. The whole of the paraffin must be afterwards washed off with clean water, applied warm, and with some force.

SORTS. Pine-apples are somewhat numerous in varieties, but for all practical purposes only a few of the best are necessary. Indeed, the good qualities of the

Pine-apple—*continued.*

few leading sorts enumerated below have been sufficient to gradually lead to the discarding of many others of less merit. There are, however, a few others in cultivation.

Black Jamaica. Flowers purple. Fruit oval, somewhat pyramidal, bronzy-yellow when ripe, attaining a weight of from 4lb. to 5lb.; pips medium, prominent, flattened in the centre; flesh firm, rich, juicy, and highly flavoured. Leaves long, finely serrated, dark green, tinged with red. Habit tall and erect. This is undoubtedly one of the best of all varieties for fruiting in winter.

Charlotte Rothschild. Flowers lilac. Fruit large, cylindrical, or slightly barrel-shaped, with medium-sized crown; pips large, flat, golden-yellow; flesh yellow, and very juicy; weight from 7lb. to 10lb. Leaves broad, with strong spines, slightly curved, dark green above, mealy beneath. This fine variety requires a high temperature, plenty of light, and dry air, to ripen it properly.

Hurst House. Fruit pyramidal, with prominent pips; flesh juicy and rich; weight sometimes 6lb. Leaves short, recurved, with strong, thickly-set spines. The habit of this variety is very dwarf and compact; consequently, it is adapted for culture where space is limited. It is only of use as a summer variety. SYN. Fairrie's Queen.

Lady Beatrice Lambton. Flowers purple. Fruit pyramidal or conical, with medium or small crown; pips broad, flattened, orange-colour, with deep yellow in the furrows between; flesh pale yellow, remarkable for the abundance of its juice, flavour rich and excellent; average weight about 9lb. (a specimen weighing 11lb. 7oz. has been grown by Mr. Hunter, at Lambton Castle, Durham, where the variety was raised by the late Mr. Stevenson, in 1860). Leaves straight and erect, dark green, covered with whitish mealiness; spines strong, widely set. A large and exceedingly handsome variety, likely to prove, under good cultivation, one of the best for general use, and also for fruiting in winter. It is less spreading in habit than the SMOOTH-LEAVED CAYENNE.

Lord Carington. Flowers purple. Fruit long, pyramidal, dark orange; pips medium, nearly flat; flesh pale yellow, tender, rich, and highly flavoured; weight from 4lb. to 7lb. Leaves broad, thickly set with medium-sized spines. A fine winter variety of the JAMAICA section, first brought into notice by Mr. Miles, gardener to Lord Carington, Wycombe Abbey, Bucks.

Queen. Flowers lilac. Fruit cylindrical, rich deep yellow when ripe; pips medium or rather small, prominent; flesh pale yellow, remarkably juicy and sweet; weight from 3lb. to sometimes 8lb. in fine specimens. Leaves very short, broad, bluish-green, very mealy, with strong spines widely disposed. One of the best Pine-apples for general cultivation; it is unexcelled in summer and autumn by any other, but does not swell properly in winter. This is supposed to be the oldest Pine-apple we have. There are several sub-varieties grown, that known as the RIPLEY QUEEN being the best. It propagates freely, and ripens off its fruit quickly. QUEEN Pine-apples will keep in good condition for three weeks after they are ripe.

FIG. 155. SMOOTH-LEAVED CAYENNE PINE-APPLE.

Smooth-leaved Cayenne. Flowers purple. Fruit very large, cylindrical or somewhat barrel-shaped, dark orange-yellow; pips large, flat; flesh pale yellow, rich, and highly flavoured; weight from 6lb. to 9lb.; crown large. Leaves long, broad, dark green, almost free from spines. A very handsome variety, one of the best for fruiting in winter and early spring, when it is more juicy than any other. See Fig. 155. This is the variety which is so largely grown in the Azores, whence the English fruiterers obtain their principal supply of fruits from autumn

Pine-apple—*continued.*

until the following May. It does not produce suckers very freely.

Thoresby Queen. Flowers purplish-lilac. Fruit large, barrel-shaped, stouter and shorter than that of CHARLOTTE ROTHSCHILD; pips flat, swelling evenly; flesh deep orange-yellow, firm, moderately juicy; weight 6lb. to 8lb; crown small. Leaves taller than those of the common QUEEN, with very fine, thickly-set spines. Plant of dwarf and distinct habit. The flavour is not considered equal to the true QUEEN, but the variety is favoured in some parts. SYN. Bennett's Seedling.

PINE-APPLE FLOWER. A common name for *Eucomis punctata.*

PINE-APPLE SPRUCE GALL. *See* **Spruce Pine-apple Gall.**

PINE BARK BEETLES. Numerous species of small beetles (never exceeding ¼in. in length, and usually not over ⅛in. or ⅛in.) live below the bark of Fir-trees and other Conifers. They have a great general similarity in appearance, the body being usually nearly cylindrical, or slightly flattened from above downwards; the wing-cases are rounded down at the hinder end and

FIG. 156. TOMICUS LARICIS (much enlarged).

along the sides (see Fig. 156). The colour is a shade of brown, sometimes approaching pitchy-black; but it is often modified by a coating of short hairs of a different hue. The females burrow through the bark, and form a tunnel between it and the wood, a task facilitated by their form. The burrows vary greatly in details, each species of beetle forming its own characteristic and easily-recognised type of burrow. Along the sides of this the eggs are placed at intervals; and the larvæ, as soon as hatched, make burrows for themselves, usually diverging from that of the mother in such a way as to avoid interfering with each other. They have no legs, are fleshy, and are nearly white in colour. They become pupæ generally in their tunnels, and the beetles emerge from them about June and July, or there may be two broods. For egg-laying, they almost always select trees in an unhealthy state: hence, their ravages as larvæ do little real harm to forests; but, in the case of ornamental Conifers, they may, at times, destroy choice plants that, but for this additional foe, might have recovered. A number of the species found in this country, *e.g.*, *Hylesinus ater*, *H. opacus*, *Tomicus bidentatus*, and *T. Laricis* (see Fig. 156), as beetles, have been observed to injure the Firs and other Conifers by gnawing the bark of young shoots; and they are known to kill young plants, even up to the tenth year of growth, by stripping the bark from the base of the stem. Others, and among these notably *Hylesinus piniperda*, bore into young twigs, and eat out the pith in the centre, from the base towards the tip. The twigs die, dry up, and fall off, frequently in considerable numbers. If the leading shoots have been pierced, the form and value of the tree are largely affected. The genera and species of Bark Beetles are so much alike that the distinctive characters are recognisable only by practised entomologists: hence, it is vain to attempt to give descriptions of the many species that are to be met with on Firs and other *Coniferæ* in Britain.

Pine Bark Beetles—*continued.*

Remedies. The Beetles prefer to lay their eggs under the bark of tree-stumps, cut branches, brushwood, &c.: hence, it is advisable to remove and burn all such refuse, without delay, except so much as may be left as a trap to attract the females; and this also should be burned after the purpose is served. The traps should be renewed every three or four weeks, while the Beetles are out, *i.e.*, from early spring till the end of July, and again in late autumn, since some species appear in autumn, and hybernate. All diseased plants, if small, should be uprooted and burned. Badly-diseased trees, if too large to be entirely burned, should have the bark stripped off and burned. It is hardly possible to do anything to preserve a tree that has been severely attacked, more especially as it is almost always suffering from other causes; and the better course is to uproot and destroy all such trees at once. If the attack is slight, and the tree is a valuable one, it may be possible to stop the evil by measures to promote the growth of the tree, thereby rendering it unsuited to the taste of the insects. An insecticide, such as Gishurst's Compound or petroleum, may also be injected into such holes as can be discovered in the bark, in order to destroy the beetles or larvæ in them.

PINE-BARREN BEAUTY. *See* **Pyxidanthera barbulata.**

PINE, BLACK. *See* **Pinus austriaca.**

PINE BUD MOTH, or **PINE BUD TORTRIX.** *See* **Retinia.**

PINE, CLUSTER. *See* **Pinus Pinaster.**

PINE, DAMMAR. *See* **Dammara.**

PINE, KAURI. *See* **Dammara australis.**

PINELLIA (a commemorative name, given to this genus by Tenore). SYNS. *Atherurus, Hemicarpurus.* ORD. *Aroideæ* (*Araceæ*). A genus comprising three or four species of hardy, tuberous herbs, natives of North China and Japan. Flowers all fertile; spathe marcescent, the tube convolute, the blade oblong and concave; spadix naked at base, the appendix worm-like, elongated, exserted; peduncle solitary. Leaves tri- or pedati-sect, membranous; segments oblong-lanceolate or elliptic, acute; petioles elongated, sometimes bearing gum at apex. The species described below thrives in any sandy, well-drained border. It is readily propagated by division during winter, or at any time before growth has too far advanced.

P. tuberifera (tube-bearing). *fl.*, spathe with a narrow-cylindrical tube and an oblong lamina; spadix with a filiform appendage, twice as long as the lamina of the spathe. *l.*, adults trisected; segments oblong-elliptic, acute at both ends, the middle one nearly or quite twice the size of the lateral ones; petioles bearing tubercles. Japan, &c.

PINE LOPHYRUS. *See* **Pine Sawflies.**

PINE, MORETON BAY. A common name for *Araucaria Bidwillii.*

PINE, NORFOLK ISLAND. *See* **Araucaria excelsa.**

PINE SAWFLIES. Under **Lophyrus** and **Lyda** will be found some general remarks on the Sawflies that belong to these genera. The species are all more or less hurtful to Conifers, but *Lophyrus Pini* is the one generally denoted by the name of Pine Sawfly. The insects are heavy-bodied, with four transparent wings, which often show a play of iridescent colours. In the male they reach about ½in., and in the female about ¾in., in their expanse. The male is black. The female is pale yellowish-white, with black head, antennæ, and breast; and the back between the wings, and a large patch on the abdomen, are black. The eggs are laid on the leaves, in slits made by the females. The larvæ feed in company, eating the leaves from the tips downwards, and also

Pine Sawflies—*continued.*

gnawing the bark of the young twigs, and thus doing great damage to the Scotch Fir. They are usually light greenish-yellow in colour, more rarely pale yellow, or dark green above, and are sprinkled with minute black granules. The head is brown, with dark spots. When full-fed, the larvæ crawl under moss and leaves, or into crevices, and spin oval cocoons, about ½in. long, of very compact texture, and usually dull brown in colour.

The other Sawflies most injurious to Firs and to other Conifers in Britain, are the following: *Lophyrus frutetorum*, *L. sertiferus* (*L. rufa*), and *L. virens*; and of the genus *Lyda* the most hurtful are *L. erythrocephalus*, *L. nemorum*, and *L. stellatus.* In their general appearance and habits, they agree with *Lophyrus Pini*, differing only in minor details. It is unnecessary to enter into descriptions of the different species, since they are so much alike; the same means of destruction may be employed against all of them.

Remedies. Moss, loose bark, and other *débris*, amongst which the cocoons are spun, should be collected and burned. The larvæ may be hand-picked from the branches, or crushed on them, with good results. Naphtha and solutions of Hellebore have also been directed upon them successfully. They may be shaken from larger trees, and crushed under foot; or they may be prevented from re-ascending by putting a belt of any sticky compound round the stems of the trees.

PINE, SCREW. *See* **Pandanus.**

PINE STRAWBERRY. *See* **Fragaria chilensis grandiflora.**

PINE WEEVILS. *Hylobius Abietis* is a beetle very hurtful to the Scotch Fir, and to various other Conifers, as it feeds, in the perfect state, on the bark of the young shoots. It is seldom very destructive in gardens, or in pleasure-grounds, but does most harm amongst young trees growing in the neighbourhood of recently-felled plantations, where brushwood, &c., has been lying about for some time. The beetles are ½in. to ¾in. long, dull black, with scattered tufts of yellow hairs. The thorax is narrowed in front, and the head is small, and bears a decurved proboscis, on which are the antennæ, abruptly elbowed at the tip of the long first or basal joint. The wing-cases are rough, with lines of pits and tubercles, and there are numerous small pits on the head. The beetles appear from May to July. They gnaw the buds and the bark of the twigs, interfering, in this way, with the development of the trees. The eggs are laid in crevices on stumps of Firs, on logs, and on cut branches; and the white, legless larvæ, on hatching, burrow into the wood, and feed on it, making galleries that increase in size with their own growth. At the end of the burrow, a cocoon is formed, by the full-fed larva, of the fragments gnawed by it in making the gallery. Here, in spring, it becomes a pupa, in which state it passes about four weeks.

Pissodes notatus and *P. Pini* belong to a genus closely allied to *Hylobius*, and are not less hurtful. They are, however, easily known from that genus by having the antennæ in the *middle* of the narrowed beak, while *Hylobius* has them situated quite near its tip. The thorax also is broader compared with the wing-cases. Both species of *Pissodes* are rather smaller than *Hylobius Abietis.* In general appearance and colour, they agree not a little with that beetle. They are of a pitchy-brown colour, but this is modified by a coating of yellowish-white scales or hairs, more conspicuous in certain parts. Their general appearance is shown in Fig. 157. Both are about ¼in. long. The larvæ of *P. notatus* live under the bark of *living* trees of good size; and those of *P. Pini* in old stumps, &c., making winding galleries, in which, when full-fed, they spin oval cocoons of fragments of wood and silk. The beetles emerge from July

Pine Weevils—*continued.*

to September. As beetles, they destroy the young branches of Conifers by boring small holes in them, and sucking the sap (see Fig. 157). Resin is apt to flow out from the openings, and the branches die, and fall off.

Prevention. This is best insured by the removal and burning of the branches, &c., cut off in wood-cutting operations. The supply of food for the larvæ is thus stopped. The perfect insects may be caught by using, as traps, flat pieces of bark, laid on the ground under weights, and frequently examining them; from these the

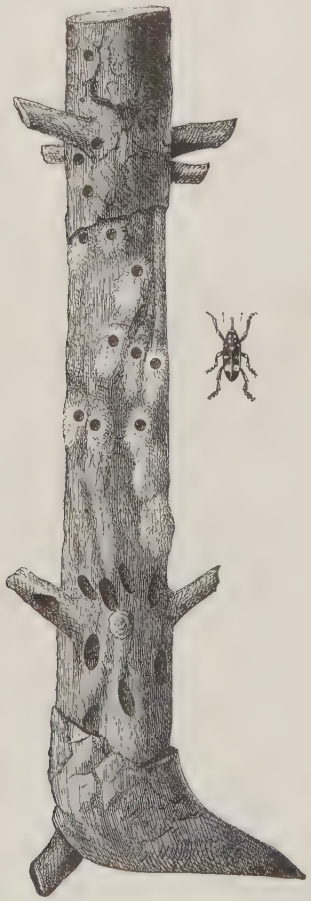


FIG. 157. PISSODES NOTATUS, showing Insect (natural size) and Ravages to Trunk committed by it. The bark has been removed from the middle of the trunk, to show the galleries.

beetles can be picked off. Or cut branches may be placed in suitable localities, and the beetles attracted to them may be shaken off and killed. A few logs should be left for a time, to induce the females to lay their eggs thereon; but they should be burned while the larvæ are still in them. Young Conifers should not be planted on the site of an old plantation, where numerous stumps serve as breeding-places for the beetles. Hand-picking is of use where the trees to be protected are few and small.

PINGUICULA (a diminutive from *pinguis*, fat; referring to the greasy texture of the plants). Butterwort. ORD. *Lentibularieæ*. A genus of greenhouse or hardy, terrestrial herbs, broadly dispersed (in boggy places) over the extra-tropical regions of the Northern

Pinguicula—*continued.*

hemisphere, a few being found in the Andes of America, extending as far as the Antarctic regions. Upwards of thirty species have been described, but probably not more than twenty are really distinct. Flowers terminal; calyx four or five-parted or bilabiate; corolla purple, violet, or yellow, bilabiate, the lobes all spreading, entire or emarginate; scape erect, one-flowered, leafless, ebracteate. Leaves radical, rosulate, entire, often greasy to the touch. The hardy species thrive in a marshy, boggy soil, and are propagated by seeds, by leaf cuttings, or by division. The greenhouse species thrive in well-drained pots of peat and sphagnum or in fibrous peat and pieces of broken pots, and may be increased by the same means. The under-mentioned species are the best for gardening purposes. They are all perennials.

P. alpina (alpine). *fl.*, corolla white; lips unequal; throat yellow, hairy; spur very short, conical. May and June. *l.* elliptic, slightly pilose above. *h.* 3in. Arctic Europe (Scotland), &c. (Sy. En. B. 1123.)

P. Bakeriana (Baker's). A synonym of *P. caudata.*

P. caudata (tailed).* *fl.* of a beautiful, rich, deep carmine, on long scapes, terminal. Autumn. *l.*, when young, in dense rosettes, fleshy, long, narrow, with slightly incurved tips; in older plants few, large, obovate, obtuse, with a thick, obscure midrib, dull pale green, with dirty-purplish margins. Mexico, 1881. A lovely greenhouse plant. (B. M. 6624; Gn., August, 1881.) SYNS. *P. Bakeriana* (G. C. n. s., xv. 541), *P. flos-mulionis* (B. H. 1872, 371).

P. flos-mulionis (muleteer's-flower). A synonym of *P. caudata.*

P. grandiflora (large-flowered).* *fl.* violet-blue, on radical scapes; corolla 1in. or more long, and nearly as much in width, with a broad, open mouth. Summer. *l.* in rosettes, light green, fleshy, oval or oblong, obtuse. South-west Ireland. A handsome bog plant. (G. C. n. s., iv. 27; Sy. En. B. 1122.)

P. hirtiflora (hairy-flowered). This much resembles *P. vulgaris*, but the flowers are paler, with a yellowish throat, sparsely glandular or glabrous, the peduncles and calyx are hairy, and the slender spur is straight or incurved. Mountains of Italy and Greece, 1885. Hardy. (B. M. 6785.)

FIG. 158. PINGUICULA VULGARIS.

P. lusitanica (Portuguese). *fl.*, corolla lilac, with a yellow throat, ½in. long; lips nearly equal, the lower pouched from without; scapes very slender. June to October. *l.* ¼in. to ⅝in. long, oblong, shortly petiolate, thin, succulent, obtuse, with incurved margins. *h.* 6in. Europe (Britain). (Sy. En. B. 1124.)

P. lutea (yellow). *fl.*, corolla yellow and golden, nearly 1in. long, campanulate, somewhat five-fid, the lobes scarcely distinct, sinuated or cut. June. *l.* obovate-elliptic, somewhat glabrous, 1in. long, slightly obtuse. *h.* 3in. North America, 1815. Half-hardy. (B. R. 126.) The form *edentula* has all the corolla lobes obcordate, and not laciniated. (H. E. F. 16, under name of *P. edentula.*)

Pinguicula—*continued.*

P. orchidoides (Orchis-like). *fl.*, corolla violet-purple, nearly 1¼in. long, somewhat five-parted, with a very short, constricted tube, and oblong-obovate, sub-equal lobes. October. *l.* spathulate-rotundate, 1¼in. to 1½in. long, 1in. broad, thick, pilose above. *h.* 3in. to 4in. Mexico, 1845. Greenhouse. (B. M. 4231.) This is probably simply a form or condition of *P. caudata*.

P. vallisneriæfolia (Vallisneria-leaved). *fl.* soft purple or lilac-purple, with conspicuous, white or pale centres, large. Summer. *l.* pale yellowish-green, linear, in dense tufts, and undulated at the margins. Mountains of Spain. Half-hardy. (Gn., April, 1878.)

P. vulgaris (common). Bog Violet; Butter-root. *fl.* violet; corolla with the lower lip much longer and broader than the upper; segments broad or obtuse; scapes several, 4in. to 6in. long, purplish. May to July. *l.* 1in. to 3in. long, appressed to the ground, oblong, obtuse, succulent, with incurved margins; petioles broad, very short. Europe (Britain), &c. See Fig. 158. (Sy. En. B. 1121.)

PINK. The typical species of *Dianthus*, from which the garden Pinks are supposed to have descended, is *D. plumarius*, a native of Eastern Europe, which has become naturalised in some parts of Britain. Since it was introduced to cultivation in this country, about the year 1629, numerous varieties and forms have been produced; but most of the improvement, from a florist's point of view, has been made during the present century. The common white Pink is a well-known occupant of almost all gardens; yet its flowers are so pure and sweet-scented that they are always welcomed. For cutting, all the varieties of garden Pinks are invaluable; they are also amongst the most popular and easily-grown of border plants.

Pinks may be propagated by seeds, by layers, or by cuttings; the latter are usually termed pipings. Seeds and layers are treated in precisely the same way as those of the **Carnation** (which *see*). Pipings usually answer best for the propagation of Pinks; they are produced in quantity round the base of old plants, and should be taken soon after the flowering season is past, and inserted, about 1in. apart, in very sandy soil, under hand-glasses, where they should be kept shaded from sunshine. All the preparation necessary is to remove a few of the lower leaves, taking care, however, to preserve the young buds, and to cut off the end, close to the bottom joint, with a sharp knife. The glasses should be kept on until roots are formed, when the young plants may have air gradually admitted to them, and be afterwards placed in a prepared border, in the open air.

Planting is best performed in September, so that the plants may become established and well rooted before winter; this is of great importance, as it considerably affects their future well-being. It should not be deferred later than the end of September. If planted in lines, a distance of about 1ft. should be allowed between them, and 9in. apart in the lines will afford sufficient space for the first year at least. Pinks succeed well in any fairly rich, loamy soil; but when the production of large flowers is the chief aim, a bed should be specially prepared for them. This should be raised above the ordinary ground level, and made up with turfy loam, leaf mould, and well-decomposed manure. Road scrapings, or anything of a similar gritty nature, are of great use for intermixing. Prepared beds should be made up about August, and be forked over occasionally; they should be from 1ft. to 1½ft. in depth. When raised above the path, an edging of some sort is generally necessary for keeping up the soil, preventing water from running off, and defining the beds. A top-dressing of horse-manure, 1in. thick, should be put on during March, and lightly forked in. Another top-dressing of manure may be given with advantage at the latter end of May, and water copiously applied, in the evenings, after hot, dry days, in summer. When large flowers are required, disbudding must be practised, and side growth removed at an early stage, in order to throw the strength into the limited number of buds left; when

Pink—*continued.*

the flowers are only required for cutting and for border decoration, this is unnecessary.

There is a valuable section of Pinks that are well adapted for forcing under glass, to flower before those outside. They will not withstand much heat, but may be gradually brought on in a cool temperature, and where plenty of air is admitted. Pinks for forcing should be thoroughly established. Cuttings must be inserted in pots, so soon as any are procurable, in spring, and placed in a gentle bottom heat. The young plants thus obtained may be grown on, under glass for a time, and then in a prepared bed all summer; they should be carefully lifted, and placed in pots, early in autumn, and wintered near the glass, in a cold frame.

Varieties. These may be divided into two classes, Show or Laced kinds and Border Pinks; nearly all of the latter are adapted for forcing, and are invaluable for ordinary decoration in outside beds. The following is a selection from the best varieties:

Border and Forcing Pinks. ANNE BOLEYN, pink, dark centre; large, very free-flowering. ASCOT, soft, fleshy-pink, with deep carmine centre; dwarf, extra fine and floriferous. CARNEA, flesh-colour, dark blotch at the base of each petal. DELICATA, white, dark plum centre, fringed. DERBY DAY, deep pink, laced with purple, large flower; distinct. FIMBRIATA MAJOR, pure white; a very large, fringed form of the old white variety, about three times the size; very free. HERCULES, white, rich dark lacing, very large. LADY BLANCHE, pure white, small; fine for forcing and buttonholes. LORD LYONS, deep rosy-purple, large, smooth, full flowers; free and distinct. MISS OWEN, centre dark velvety-maroon; exceedingly dwarf. MRS. GRIEVE, pink, laced with maroon, fringed; very distinct and floriferous. MRS. JAMES WELSH, rich crimson self, fringed; dwarf. MRS. PETTIFER, white, with light purple lacing; very useful. MRS. SINKINS, pure white, very sweet-scented; flowers very large; habit dwarf, sturdy, and very hardy; extra fine. MRS. W. M. WELSH, white, shaded yellow, edges slightly fringed; vigorous grower. NEWMARKET, rich pink, dark lacing; free. PILRIG PARK, pearl-white, edged pink, centre yellow and crimson; a beautiful single variety. ROBUSTA, pale pink, fringed, very fragrant; vigorous habit. ROSEA, rose, dark centre, fringed. RUBENS, dark flowers; dwarf and free habit. SNOWDON, pure white, very large; free-flowering and late. TOM WELSH, peach, laced deep crimson, fringed.

Show or Laced Pinks. ATTRACTION, fine deep ruby; good form. BEAUTY OF BATH, beautiful rose-lake. BERTRAM (Turner), red, broad lacing; extra fine. BOJARD (Turner), broad, smooth petals, beautifully laced bright red; extra fine. CLARA (Maclean), red, full size; very constant. CRITERION, light rose; neat. EMERALD, red lace, large and full; fine form. ENSIGN (Fellowes), broad red lace. GALOPIN (Turner), rosy-red lace; large and fine. GODFREY (Turner), bright reddish-purple; extra fine. HARRY HOOPER (Hooper), reddish-purple, bright lace; distinct. JAMES BLACK (Dicksons and Co.), pure white, plum-purple lacing; very large and constant. JESSICA (Turner), red, large, full flower. JOHN BALL (Maclean), dark plum-purple; extra fine. LADY CRAVEN (Hooper), fine red, very rich. MALCOLM DUNN, pure white, heavily laced maroon; full flower. MR. HOBBS (Looker), rosy-purple. MRS. DR. GRAY (Dicksons and Co.), pure white, narrow maroon lacing, neat and smooth; extra. MRS. JAMES GALLOWAY (Dicksons and Co.), pure white, very narrow peach lacing; one of the most delicately-marked varieties. MRS. WAITE (Turner), rosy-red; medium size. RELIANCE (Hooper), red lace, large and fine. SHIRLEY HIBBERD (Turner), rosy-purple; large, full, and fine. VOLUNTEER, rich rosy-purple. WILLIAM PAUL (Paul), clear rose lace, large, full flower; extra fine.

PINKNEA. A synonym of **Pinckneya** (which *see*).

PINKNEYA. A synonym of **Pinckneya** (which *see*).

PINK OF MY JOHN. A common name for **Viola tricolor** (which *see*).

PINNA. One of the primary divisions or leaflets of a pinnate leaf.

FIG. 159. PINNATE (SIMPLE) LEAF OF JASMINE.

PINNATE. When leaflets are arranged along each side of a common petiole. A Pinnate leaf of Jasmine is shown at Fig. 159.

PINNATIFID. Divided into lobes from the margin

FIG. 160. PINNATIFID LEAF.

nearly to the axis. A Pinnatifid leaf is shown at Fig. 160.

PINNATILOBED. When the leaves are divided to an uncertain depth.

PINNATIPARTITE. When the lobes pass beyond the middle and the parenchyma is not interrupted.

PINNATISECT. When the lobes are divided down to the midrib, and the parenchyma is interrupted.

PINNULE. The secondary division of a pinnate leaf.

PINUS (the old Latin name used by Virgil, &c.; probably derived from *pix*, *picis*, pitch; alluding to the resinous exudations). Deal-tree; Pine-tree. ORD. *Coniferæ*. A genus comprising about seventy species of mostly hardy, evergreen trees, rarely shrubs, broadly dispersed over the extra-tropical regions of the Northern hemisphere; a few being found between the tropics in Eastern Asia, the West Indies, and Central America. Flowers monœcious. Leaves dimorphous; primary ones small, scale-like, scarious or hyaline, marcescent, spirally many-seriate; secondary ones conspicuous, two to five in a whorl in the axils of the small scales, acicular, rather long, sometimes very long. Cones ovoid, conical, or oblong, usually sessile, solitary or fasciculate, slightly erect, horizontal, or reflexed, very rarely less than 1in., and sometimes more than 1ft., in length. Seeds furnished with ample wings, or wingless.

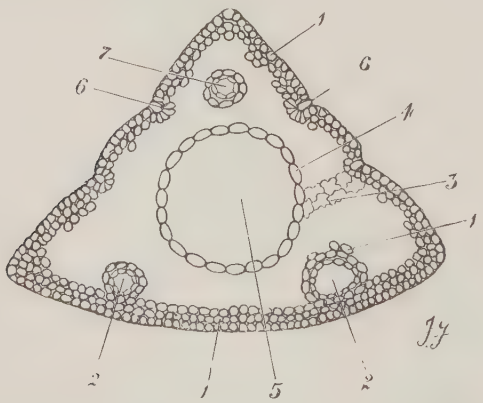


FIG. 161. TRANSVERSE SECTION OF LEAF OF PINUS EXCELSA.

1, 1, Strengthening Cells; 2, 2, Ducts, surrounded by Strengthening Cells; 3, Wavy Chlorophyll-bearing Cells that fill the entire space between the Strengthening Cells and the Bundle Sheath; 4, Bundle Sheath; 5, Position of Fibro-vascular Bundle; 6, 6, Stomata; 7, Internal Duct.

In most books, the species are classified according to the number of leaves in a sheath, but here the arrangement adopted is that proposed by the late Dr. Engelmann, published in the "Transactions of the St. Louis Academy of Science," and reprinted in the "Gardeners' Chronicle" for July 20th, 1880. Dr. Engelmann says: "I find, with Endlicher, the most valuable character in

Pinus—*continued.*

the fruit-scale, or, rather, to speak more correctly, I find that the form of the fruit-scale in this genus corresponds with a series of other characters which constitute two very natural sections of this genus. . . . . The sub-sections are distinguished by the position of the ducts within the leaf, whether peripheral, *i.e.*, near

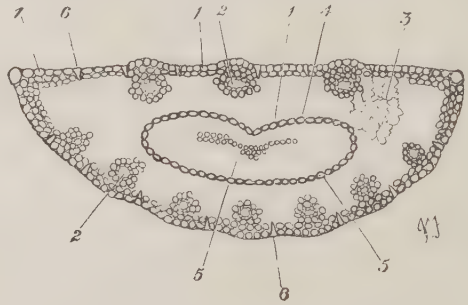


FIG. 162. TRANSVERSE SECTION OF LEAF OF PINUS SYLVESTRIS.

1, 1, 1, Strengthening Cells; 2, 2, Ducts, surrounded by Strengthening Cells; 3, Wavy Chlorophyll-bearing Cells that fill the entire space between the Strengthening Cells and the Bundle Sheath; 4, Bundle Sheath; 5, 5, Position of Fibro-vascular Bundles; 6, 6, Stomata.

the epidermis (see 2, 2, Figs. 161 and 162), parenchymatous, *i.e.*, in the cellular tissue of the leaf (see

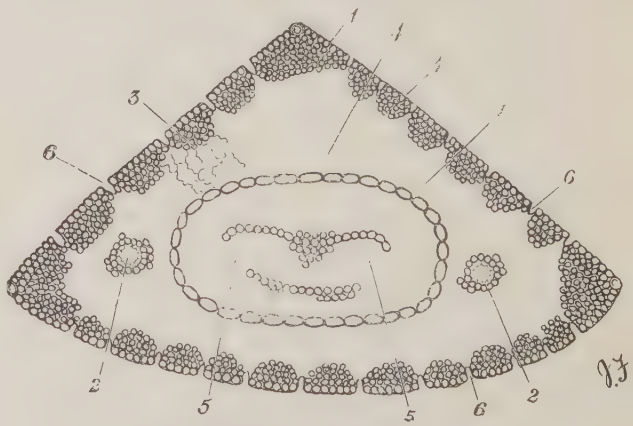


FIG. 163. TRANSVERSE SECTION OF LEAF OF PINUS COULTERI.

1, 1, 1, Strengthening Cells; 2, 2, Internal Ducts, surrounded by Strengthening Cells; 3, Chlorophyll-bearing Cells that fill the entire space between the Strengthening Cells and the Bundle Sheath; 4, Bundle Sheath; 5, 5, Position of Fibro-vascular Bundles; 6, 6, 6, Stomata.

2, 2, Fig. 163), or internal, *i.e.*, close to the bundle sheath. Subordinate to this character is the subterminal or lateral position of the female ament and the cone. Only after this may the number of leaves in a sheath be taken into consideration, and perhaps the presence or absence of strengthening cells (see 2, 2, Figs. 161, 162, 163) around the ducts. It will be found that thus not only natural, but, to some extent, even geographical, alliances are best preserved. . . . ." Want of space has prevented the characters of the sub-sections from being given; these will be found fully detailed in the works above-mentioned. For full descriptions, and more information respecting the species than it is possible to give in this work, the reader is referred to Loudon's "Arboretum et Fruticetum Britannicum," Carrière's "Traité Général des Conifères,"

Pinus—*continued.*

ed. 2, Gordon's "Pinetum," ed. 2, and Veitch's recently-published "Manual of the Coniferæ."

Section I. Strobus.

Anthers terminating in a knob or a few teeth, or in a short, incomplete crest. Leaves in fives, their sheaths loose and deciduous. Cones sub-terminal; apophysis with a marginal, unarmed umbo, generally thinner. Wood softer, lighter, less resinous.

EUSTROBI—
Buonapartea
excelsa
flexilis
Lambertiana
Loudoniana
monticola
parviflora
Strobus

CEMBRA—
Cembra
koraiensis

Section II. Pinaster.

Anthers mostly terminating in a semi-orbicular or almost orbicular crest. Leaves one to five in a bundle, their sheaths usually persistent. Apophysis with a dorsal umbo, mostly armed, generally thicker. Wood generally harder, heavier, and more resinous.

INTEGRIFOLIÆ—
aristata
Balfouriana
monophylla

SYLVESTRES—
densiflora
longifolia
Massoniana
Mughus
Pinea
sylvestris

HALEPENSES—
Bungeana
Gerardiana
halepensis
pyrenaica

PONDEROSÆ—
austriaca
chihuahuana
contorta
Grenvilleæ
Laricio
Montezumæ
ponderosa

TÆDÆ—
Coulteri
insignis
muricata
Pinaster
pungens
rigida
Sabiniana
tuberculata

AUSTRALES—
australis

CULTURE. "In arboriculture, as in landscape planting, some of the most ornamental and picturesque of trees are to be found amongst the Pines, while other species are greatly valued as *nurses* for more tender trees, for forming screens, &c. So various are the soils and situations in which the different species occur in their native countries, that there is scarcely a spot for which one or other kind is not suitable; thus, the Scotch or Wild Pine grows on the bleakest hills; *Pinus Pinaster* flourishes in shallow sands near the sea-shore; *P. rigida* attains its greatest perfection amidst the Cedar swamps of Virginia; *P. ponderosa* grows in the arid plains of Utah, where no other vegetation exists; and the Scrub Pine (*P. Banksiana*) straggles over the rocks in the cold and sterile countries east of Hudson's Bay" (Veitch).

The only satisfactory way to propagate the wild types of the various Pines is from seed, which may be sown, either in April, in sandy loam, in pots, under glass (and the young seedlings transplanted to the open ground in the following season), or in prepared beds outside. If the latter plan be adopted, the ground should

Pinus—*continued.*

be made very fine, and the seeds sown in March or April, when the ground is in good condition. After sowing, pat the bed with the back of a spade, or pass a light roller over it, and then cover lightly. The smaller-seeded kinds only require a thickness of $\frac{1}{8}$in., or even less, of sandy loam over them; the larger ones, $\frac{1}{4}$in. at most. If practicable, shade the beds, and keep them watered, until the young plants are sufficiently developed to bear full exposure. The following season, the seedlings should be placed in nursery lines, where they should not be allowed to remain more than two years without being again transplanted, or placed in the positions they are intended to occupy permanently. Probably, the best results would be attained were the seeds sown (and the seedlings not wanted thinned out) in the places where the trees were required to grow. This would, of course, involve much extra care and expense at first, but there can scarcely be a doubt that, to a great extent, the trouble would be repaid by the more rapid growth of the plants. The gold and silver variegated forms, those of a pyramidal habit, as well as the small, dense, cushion-like sports, must be increased by grafting on seedling plants of their respective types.

All the species described are hardy, except where otherwise stated.

FUNGI. Few trees are more subject to become the food of Fungi than the *Coniferæ*, the Fungi attacking the leaves or the branches in the fresh state, and the trunks and branches after the trees have been felled, or have fallen naturally. Even after the wood is employed in carpentry, in houses, &c., it is liable to the attacks of more than one "Dry Rot" producer, the worst of which is *Merulius lacrymans*. However, it is unnecessary here to consider Dry Rot and other Fungi that feed on the dead tissues, except in so far as these Fungi destroy sheds or other garden erections. The *Coniferæ* have a considerable number of parasites common to two or more of the species of trees; but each tree has certain kinds that, so far as is yet known, are peculiar to itself, *e.g.*, *Peziza Willkommii* on Larch, *Peridermium elatinum* on Silver Fir, &c. Among the Fungi more hurtful to *Coniferæ*, and especially to Firs of the genus *Pinus*, are the following: Several species of **Polyporus** (which *see*) live on the trunks of various Conifers, destroying the wood, and causing it to become soft and rotten. The tree is apt to break across at the part on which any kind of *Polyporus* has existed for some time. Among the worst of the British species are *P. mollis* on Scotch Fir, *P. vaporarius* and *P. borealis* on Scotch Fir and Spruce, and *P. annosus*, Fr. (*Trametes radiciperda*, Hartig). This last is one of the most dangerous species, because its habit of growth permits of very serious damage being done before danger is even feared. It gives rise to a state known as Red Rot, which causes the death of the tree. The injury is chiefly at the roots, and an attack is frequently unsuspected until the tree becomes pale green and dies. The roots are then found to be overgrown with the mycelium of the Fungus, which appears in cracks of the bark as whitish masses. The pileus is variable—in some cases, closely affixed to the root; in others, projecting from it, brown above, wrinkled and warty. The disease spreads gradually from a centre, destroying the trees within a progressively larger area, and without visible cause, as the Fungus passes from root to root in the soil.

The genus *Trametes* is nearly allied to *Polyporus* in structure and mode of life, and differs only in the former having the spore-bearing tubes imbedded in a substance similar to that in the pileus, while in the latter this substance differs from that in the pileus. One species, *T. Pini* (see Fig. 164), grows on living Fir-trees (more rarely on other Conifers), in which it also causes a

Pinus—*continued.*

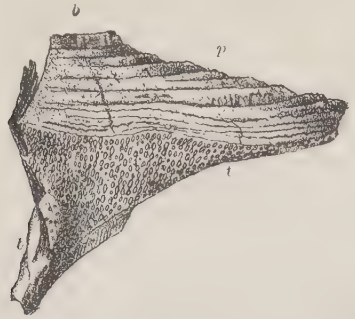


FIG. 164. TRAMETES PINI, showing (*p*) Pileus and (*t*) Openings of Spore-bearing Tubes. *b*, *b*, Bark of Fir-tree.

form of Red Rot. It is often the cause of injury to forests on the Continent; but it is too rare in Britain to give occasion for alarm.

FIG. 165. AGARICUS MELLEUS, showing, at the base, Mycelium of the Form called *Rhizomorpha fragilis*—*h*, Annulus, or Ring; *g*, Gills; *p*, Pileus.

Agaricus melleus (see Fig. 165) very much resembles *Polyporus annosus* in its effects upon the trees which it attacks; but it is far less particular as to its host, not by any means confining itself to Conifers. It is one of the Mushroom group of *Hymenomycetes*, with the spores produced on gills on the lower surface of the pileus. The latter part is convex above and varies from honey-colour to brownish, with blackish scales upon it. The pileus, or cap, varies from 2in. to 7in. in breadth. The caps spring up in large clusters, near the roots of trees, or on them, or low on the trunk (see Figs. 166 and 167). On tracing the mycelium, it will be found growing between the wood and the bark, in black, string-like or flattened bands, called *Rhizomorpha subcorticalis* and *R. fragilis*, which were formerly regarded as distinct and independent

Pinus—*continued.*

species (see Figs. 168 and 169). Other Agarics also are parasites, but none are equally dangerous with *A. melleus*.

Another Fungus injurious to Fir-trees is *Peridermium Pini*, which occurs upon both branches and leaves. The branches are generally destroyed by it, the leaves do not show signs of serious injury. *See* **Peridermium.**

FIG. 166. MASS OF AGARICUS MELLEUS ON ROOT OF YOUNG PINE—*a*, *a*, *a*, Mycelium in form known as *Rhizomorpha fragilis*; *b*, Very young Spore-bearers produced on *Rhizomorpha fragilis*; *d*, Older Spore-bearers (*Agaricus melleus*) produced by Mycelium of form known as *Rhizomorpha subcorticalis*.

The needles on various Conifers, in many parts of the country, are very frequently studded with one or more rows of small black bodies, which, under closer examination with a lens, are found to have a slit running from end to end of the upper surface. These are the perithecia of several species of Fungi grouped together in a genus called *Hysterium*. That on the Scotch Fir is *H. pinastri*. It is hurtful by causing the premature fall of the needles, and a consequent loss of nourishment

FIG. 167. AGARICUS MELLEUS. Group of young Spore-bearers (*c*) produced on *Rhizomorpha subcorticalis* (*a*), which is also shown spreading upwards at *d*; *b*, Sterile Mycelium in form called *Rhizomorpha fragilis*.

to the trees. In each perithecium are numerous relatively large cells (asci), inclosing eight long, slender, colourless spores. The tissues of the needles are early traversed by the mycelium of the Fungus; and the needles fall off usually at the end of their first year of life, but the Fungus is matured only after the leaves have been lying on the ground for some time.

It must be borne in mind that unhealthy external conditions, such as sterile soil, bad drainage, or lack of free

Pinus—*continued.*

circulation of air and light, such as prevails in badly-tended shrubberies, will destroy or weaken shrubs and trees, and that plants brought into an unhealthy condition by any of these causes are rendered far more liable to suffer harm from parasites. The larger Fungi, such as

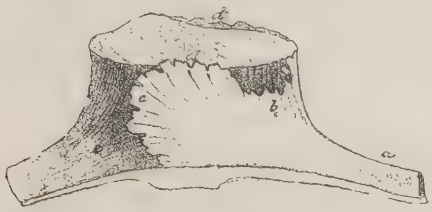


FIG. 168. RHIZOMORPHA FRAGILIS *var.* SUBCORTICALIS. Mycelium of *Agaricus melleus*, in the form it assumes when growing between the bark and the wood—*a*, Form intermediate between *fragilis* and *subcorticalis* expanding into the latter on the left; *b*, Portion where growth is slower; *c*, Lobed Margin; *d*, *d*, Margin that has reached cut surface of Stump; *e*, Wood of Stump of Fir-tree.

Polyporus, very often gain access to the stem or root through wounds left by the fall of branches or by careless pruning. Root parasites spread through the soil from diseased to healthy roots. Most of them can live for a considerable time on the dead roots; hence, young trees

FIG. 169. AGARICUS MELLEUS. Pine-root attacked by Mycelium (*a*) in the form known as *Rhizomorpha fragilis*.

should not be planted at once in the place of diseased ones that have been uprooted, however carefully the roots have been removed; and it is better, in any event, to let some time elapse, when trees are cut down, before planting others in their place.

Remedies. Whatever can promote healthy growth, especially the removal of the unfavourable conditions noted above, must be regarded as of the greatest importance as a preventive of disease due to the attacks of parasites. To prevent the spread of the root Fungi, Dr. Hartig recommends that narrow trenches be dug round the infected area, thus cutting the roots and preventing the spread of mycelium. *Polypori* on stems and branches usually denote that the wood is attacked for some distance around the spots, and that the prospect of saving the trees is not great; though, in the case of choice trees, it may be worth while to scoop away the diseased part, and to fill up the cavity in such a way as to prevent water lodging in it. Dead or dying trees should not be left standing to spread disease. Dead branches should be removed, and ragged stumps should be trimmed, and coated with some compound to prevent water and Fungus spores from getting into them. Branches attacked by *Peridermium Pini* should be cut off and burned, and Senecios should be uprooted from the neighbourhood of Fir-trees, even though the connection of *P. Pini* with *Coleosporium Senecionis* still demands investigation.

Pinus—*continued.*

Hysterium Pinastri can, probably, best be combated by the destruction of the Fungus in the needles; and, with this view, all fallen branches, bearing leaves and *débris* from trees attacked by this Fungus, should be collected, as far as possible, and burned.

In crowded shrubberies and woods, and in shady situations, the needles of Conifers are apt to be overgrown with Fungi of the group of *Fumago*, with an alga, *Pleurococcus vulgaris*, &c., which form a dark coat, like soot, on the needles. This coat prevents the latter doing their work for the welfare of the plant, and is thus hurtful, even though the plants forming it do not directly absorb food from the needles. The most effectual remedy is thinning out the shrubberies, and allowing better access of light and air.

INSECTS. Pines, Scotch Firs, and other Conifers are very subject, in forests, to the attacks of various kinds of insects; and they are liable to injury from the same insects, though in a less degree, in pleasure-grounds and gardens. The roots are sometimes injured by the operations of Cockchafers and Mole Crickets; and some of the Bark Beetles live in them in the same way as they live in the stems. The wood of the stems is bored into, and seriously damaged, by the larvæ of certain species, of which may be mentioned *Sirex*, as frequently present, the Goat Moth occasionally, and the Pine Weevils. Sickly trees often have their death hastened by the ravages of various species of small beetles (*see* **Pine Bark Beetles**) chiefly belonging to the family *Scolytidæ*; and the young branches, and the trees themselves while young, are often killed by these beetles, and by the larvæ of certain small moths, all of which bore into the branches and young stems, nearly or quite to the pith, and tunnel up them towards the tips, causing them to wither and fall. *See* **Retinia.** Several beetles are very hurtful in the mature state, by gnawing the bark off young twigs and young stems, or by puncturing the bark (*Pissodes Pini* and *P. notatus*). They thus cause an outflow of resin from each puncture. The larvæ of certain moths of the genus *Retinia* also cause an outflow of resin, which by *R. resinana* is made into a shelter that looks remarkably like a gall). The buds also are injured by these insects. The thinner branches of Scotch Firs are often swollen to twice their natural thickness by Gall Mites of the genus *Phytoptus* (*see* **Mites**), the effect of which is, frequently, the death of the branches. These galls should be cut off and destroyed, to prevent the disease spreading. The needles or leaves are eaten by numerous insects, of which the more injurious are Sawflies (*see* **Pine Sawflies**) and Moths. Of the latter, we may specify the Pine Beauty,

FIG. 170. PINE BEAUTY MOTH (*Trachea piniperda*).

Trachea piniperda (see Fig. 170), a heavy-bodied insect, with variegated wings of a reddish-brown colour, mottled with orange, yellow, white, and sometimes green; the Bordered White (*Fidonia piniaria*), a Geometer in which the male is white and black above, with feathered antennæ, and the female is dull orange-brown, with slender antennæ; and the Carpet Moths (*Thera firmata*, &c.), similar in form to the last, but with the sexes alike, the antennæ slender, and the fore-wings brown or chestnut, with a broad, darker cross-bar. Several small species of the *Tortricina* live, as larvæ, between needles of *Coniferæ*, spun loosely together, and

Pinus—*continued.*

FIG. 171. CONE OF PINUS BUNGEANA.

some do considerable injury. But, on the whole, the moths seldom do serious harm to Conifers in gardens or pleasure-grounds, though they frequently do much damage in forests. The Sawflies are more to be dreaded than the moths.

Pinus—*continued.*

Pines and other *Coniferæ* are very liable to the attacks of numerous forms of Aphides, some of which feed on the needles, and others on the branches or in the young buds. The latter, for the most part, belong to the genera *Chermes* and *Lachnus*, both of which usually have a coating of filaments like a small tuft of white cotton, secreted by, and protecting, the body; and they are, therefore, rather easily detected on the bark. The two genera are easily distinguished from one another, since *Lachnus* has short, stumpy honey-tubes on its back near the end of the body, and one of the veins of the front wing that run to the hind margin has two branches; while in *Chermes*, the honey-tubes are not present, and the veins of the front wings are all unbranched. The number of species is too great to permit of a description being here given of each one that is injurious to *Coniferæ*; but one producing a gall resembling a miniature Pine-apple, is referred to under a separate heading (*see* **Spruce Pine-apple Gall**). Several kinds of *Psylla* also feed on *Coniferæ*. In none of the Conifers would the result be worth the

FIG. 172. PINUS CEMBRA.

Pinus—*continued.*

trouble and expense of treating the plants with any of the washes or other substances that are successful against Aphides in general, except, perhaps, for the protection of very choice young plants.

The appropriate treatment to prevent or to remedy the attacks of insect foes will be found under the various headings referred to, except for the leaf-destroying moths. For these, the most successful treatment will be found to be beating or jarring the branches, and crushing all larvæ that fall to the ground.

FIG. 173. BRANCH OF PINUS CONTORTA.

P. aristata (awned-coned). *l.* in fives, thickly set all round the branches, three-sided, abruptly pointed, entire, exuding white resin on their surfaces; those on young trees 1in. to 1¾in. long, half a line wide; on old specimens, scarcely 1in. long, thickly placed all round the branchlets. *cones* purplish-brown, oval, blunt-pointed, often appearing as if varnished, 2¼in. to 2¾in. long, 1½in. broad; scales awned. Branches spreading, often contorted, covered with smooth, thin bark. *h.* 40ft. to 50ft. California, 1870. (G. C. n. s., iv. 549.)

P. australis (Southern). *l.* in threes, 8in. to 9in. long, brilliant green, rather stout and reflexed when fully grown; sheaths from 1½in. to 2in. long when young. Buds large, imbricated, and free from resinous matter. *cones* 7in. to 8in. long, 2½in. broad, of a rich chestnut-brown colour, cylindrical, tapering to a blunt point. Branches few, robust, irregularly placed. *h.* 60ft. to 70ft. Southern United States. Hardy in the Southern Counties.

P. austriaca (Austrian).* Black Pine. *l.* rich, glossy dark green, rigid, sharp-pointed, erect, rounded on one side, and slightly channelled on the other, from 2½in. to 5in. long; sheaths short, persistent. *cones* reddish-brown, 2in. to 3in. long, with less elevated, smooth and shining scales; seeds winged. *h.* 75ft. to 100ft. Austria, 1835. A handsome species, "sufficiently hardy to develop its beauty in the bleakest and most exposed situations." Its method of propagation is similar to that described for *P. Pinaster*, but the necessity of transplanting the one-year-old seedlings is even greater, as otherwise the roots are deficient in compactness, and grow in a straggling manner, which transplantation corrects and modifies. SYNS. *P. Laricio austriaca*, *P. nigra*. (G. C. n. s., ix. 275.)

P. a. aurea (golden). A fine, free-growing form, with gold-tinted foliage.

Pinus—*continued.*

P. Balfouriana (Balfour's). Fox-tail or Hickory Pine. *l.* light green, rigid, short, very glaucous on the inner face, appressed, forming tufts 1ft. or more long at the ends of the branches. *cones* oval, about 2½in. long, and half as much in diameter; scales hard, coriaceous, with a small hook, curved upwards. *h.* 40ft. to 50ft. California, 1852. An alpine species, usually with a pyramidal outline. (G. C. n. s., v. 33.)

P. Benthamiana (Bentham's). A synonym of *P. ponderosa*.

P. Bolanderi (Bolander's). A synonym of *P. contorta*.

P. Boursieri (Boursier's). A synonym of *P. contorta*.

P. Bungeana (Bunge's).* Lace-bark Pine. *l.* bright pale green, rigid, triquetrous or three-angled, compressed and sharply pointed; sheaths short, deciduous. *cones* small. Branches long and slender. *h.* 70ft. to 80ft. China, 1846. A beautiful and distinct species, rare in cultivation. See Fig. 171. (G. C. n. s., xviii. 8.)

P. Buonapartea (Buonaparte's). *l.* in fives, but sometimes six, seven, eight, or nine in the same sheath, glaucous-green, angular on the inner face, very slender, 5in. long. *cones* straight, nearly cylindrical, 10in. to 12in. long, 3in. to 4in. in diameter; seeds large, with broad wings 1in. long. Trunk straight, furnished with long, slender branches in regular whorls, and pendent branchlets 2ft. to 3ft. long. *h.* 130ft. Sierra Madre. A noble, tolerably hardy tree.

P. californica (Californian). A synonym of *P. insignis*.

P. carpatica (Carpathian). A synonym of *P. Mughus*.

P. Cembra (Cembra).* Swiss Stone Pine. *l.* marked with silver lines, slender, flexible, triquetrous, three-angled, with rough edges, 2in. to 5in. long; sheaths small, deciduous. *cones* erect, oval, 3in. to 4in. long; scales smooth, terminating in a broad, obtuse spine; seeds about ½in. long, edible. *h.* 50ft. to 150ft Central Europe and Siberia, 1746. A very slow-growing species with a close, erect, symmetrical habit, and remarkable in the fact that the seeds do not vegetate until the second spring. See Fig. 172. There are numerous varieties; that known as *pumila* is a dwarf, stunted bush, rarely exceeding 4ft. in height; its leaves and cones are shorter than those of the type.

P. chihuahuana (Chihuahua). *l.* in threes, very rarely in fours, finely toothed along the edges, 2in. to 3in. long, glaucous above, light green beneath. *cones* 1in. to 1½in. long, smooth, egg-shaped, *h.* 30ft. to 50ft. Chihuahua Mountains, North Mexico.

FIG. 174. CONE OF PINUS COULTERI (much reduced).

P. contorta (twisted). *l.* bright green, small, from 1in. to 2in. long. *cones* ovoid, almost spherical, about 1½in. long, very persistent. Branches numerous, sub-erect or spreading. *h.* 25ft. to 30ft. California, 1831. This species, "in its young state, in this country, is a compact, pyramidal, densely-branched tree, with the branches much twisted or gnarled, and well furnished with grass-green foliage" (Veitch). See Fig. 173. (G. C. n. s., xix. 45.) SYNS. *P. Bolanderi*, *P. Boursieri* (F. d. S., 1854, 934 b).

P. c. Murrayana (Murray's). This form makes a much taller, and straighter tree than the type, from 80ft. to 120ft. high, and 4ft. to 6ft. in diameter, with light green leaves, mostly about

Pinus—*continued.*

2in. long, a conical head, and thin, scaly, light greyish-brown bark. California. SYN. *P. Murrayana.*

P. Coulteri (Coulter's).* *l.* beautifully glaucous, rigid, triangular and flattened, incurved, clustered at the extremities of the branchlets, 9in. to 12in. long; sheaths long. *cones* very large, about 12in. long, 6in. in diameter at the broadest part, and weighing from 4lb. to 5lb.; scales very thick, woody, armed with a strong, hooked spine, yellowish-brown. Branches spreading, with the extremities ascending. *h.* 50ft. to 70ft. California, 1832. A very handsome and distinct species. SYN. *P. macrocarpa.* See Fig. 174. (G. C. n. s., xxiii. 409.)

P. densiflora (dense-flowered). *fl.*, male catkins clustered into a thick, cylindrical spike, from 2in. to 3in. long. *l.* bright green, rather stiff, from 3in. to 4in. long, rounded on the upper surface, channelled beneath, slightly scabrous or roughish, crowded towards the extremities of the branchlets. *cones* about 2in. long. Trunk tapering; branches ascending. *h.* 40ft. to 50ft. Japan. (R. H., 1874, 273.)

P. Don Pedri (Don Pedro's). A synonym of *P. Loudoniana.*

FIG. 175. LOWER PART OF CONE OF PINUS EXCELSA.

P. excelsa (tall).* Bhotan Pine. *l.* glaucous-green, very slender and flexible, drooping, triquetrous, with rough edges. *cones* cylindrical, pendulous, slightly curved, 6in. to 8in. long; scales large, wedge-shaped, loosely imbricated. Branches regularly whorled, the upper ascending, and those below decumbent. *h.* 60ft. to 150ft. Himalayas, 1827. A handsome, slender tree, of rapid growth. See Figs. 175 and 176. (G. C. n. s., xix. 244.)

P. flexilis (pliant). White Pine. *l.* rigid, crowded, about 2in. long. *cones* from 4in. to 5in. long; scales wedge-shaped. *h.* 5ft. to 50ft. California, 1851. A slow-growing tree, closely allied to *P. Cembra*, but having more flexible branches, and a bushy habit. (G. C. 1875, 376.)

P. f. albicaulis (white-stemmed). *l.* light glaucous-green, rigid, erect or sub-erect, triquetrous, compressed, 1½in. long. *cones* ovoid, 2in. to 2½in. long. Branches and their ramifications numerous. *h.* 20ft. to 30ft. South California, 1846. A slow-growing, irregular-shaped species. (J. H. S. i., p. 236.)

P. Fremontiana (Fremont's). A synonym of *P. monophylla.*

P. Gerardiana (Gerard's). *l.* glaucous-yellowish-green, rather rigid, triquetrous, abruptly pointed, 4in. to 5in. long. *cones* subglobose or ovate-oblong, sometimes 4in. to 5in. in diameter; scales thick, spiny; seeds large, edible. Branches ascending, lower ones spreading. *h.* 40ft. to 50ft. Himalayas, 1830. A handsome tree, with a conical outline and smooth bark.

P. Grenvilleæ (Grenville's). *l.* in fives, 12in. to 14in. long. *cones* solitary, pendulous, narrow, conical, about 15in. long. *h.* 60ft. to 80ft. Colmia, 1881. A fine and striking, tender tree. (G. C. n. s., xv. 113.)

P. halepensis (Aleppo).* *l.* rather light, slender, from 3in. to 5in. long, clustered at the extremities of the branchlets, sometimes in threes, and of but two years' duration. *cones* at first acutely conical, about 2½in. long, ultimately much shortened and rounded; scales broad, flat, yellowish-brown. Branches slender. *h.* 40ft. to 50ft. Levant, 1683. (G. C. n. s., xxii. 553.)

P. insignis (remarkable).* Monterey Pine. *l.* dark green, slender, soft, flexible, twisted, slightly appressed, 4in. to 6in. long. *cones*

Pinus—*continued.*

very ornamental, 4in. to 5in. long, obtuse at the base, pointed at the apex; scales spineless, smooth, glossy orange-brown in colour. Branches dense. *h.* 80ft. to 100ft. California, 1833. This is described as one of the handsomest of all the Pines; it is, however, only hardy enough to bear the winter in mild south and south-west climates. A sheltered position is at all times most essential. SYNS. *P. californica, P. radiata.* (G. C. n. s., ix. 108.)

P. koraiensis (Corean). *l.* bright glossy green on the outer and broader side, and silvery on the two inner ones, slender, trigonal, 3in. to 4in. long, edges roughish. *cones* almost cylindrical, very obtuse at both ends, 5in. long; scales hard and leathery, the points recurved. Branches ascending. *h.* 20ft. to 30ft. Corea and Japan, 1861. An elegant species, with a compact habit, and forming a densely-rounded head.

FIG. 176. BRANCH OF PINUS EXCELSA.

P. Lambertiana (Lambert's). Sugar Pine. *l.* bluish-glaucous-green, triquetrous, the edges rough, slightly twisted, clustered towards the ends of the branches. *cones* cylindrical, tapering at the apex, 15in. to 20in. long, and 3in. to 4in. in diameter; scales large, loosely imbricated; seeds large, edible, of a nutty flavour. Branches pendulous. *h.* 150ft. to 300ft. California, &c., 1827. This, one of the tallest of all Pines, has an enormous girth, the massive, perpendicular trunk being generally bare of branches two-thirds of its height from the ground. It stands the English climate well, and seldom suffers in the severest winters. It has an elegant appearance, while growing, during its infancy, and early displays a remarkable magnitude of trunk in relation to its height. In its native country, it is found covering districts of pure sand.

P. Laricio (Larch-like).* Corsican Pine. *l.* spreading, and curved or wavy, 6in. long, or less. *cones* pale brown, closely resembling those of *P. austriaca* in size and shape; scales with a very short point; seeds winged. Branches not numerous. *h.* 100ft. to 150ft. South Europe, 1814. "This Pine is easily recognised by its strict, erect habit; by its shortened branches, which sometimes show a tendency to curve in a direction round the tree and upwards; and by its large, twisted, glaucous foliage" (Veitch). It is better suited for richer soils, in lower situations, than many other Pines, and is therefore well fitted for planting out when a bold and prominent tree is needed in extensive grounds of park-like pretensions. See Fig. 177. (G. C. n. s., xxi. 15.)

P. L. austriaca (Austrian). A synonym of *P. austriaca.*

P. L. karamana (Karamana). *l.* in pairs, arranged in tufts at the ends of the upturned branches, 6in. to 8in. long, dark green. *cones* solitary or in pairs, spreading, 4in. long, 1½in. thick, elongated, ovoid-conical, resembling those of the Austrian Pine, but much larger. Bark pale brown. Asia Minor, 1884. (G. C. n. s., xxi. 91.)

P. L. Pallasiana (Pallas'). *l.* rigid, sub-erect or erect, sparsely set towards the ends of the branchlets, 6in. long. *cones* as large

Pinus—*continued.*

as, or larger than, in the type. *h.* 60ft. to 80ft. Crimea, 1790. SYN. *P. taurica.*

FIG. 177. PINUS LARICIO.

P. L. pygmæa (dwarf). "A dwarf, dense bush, with all its branches and their ramifications much shortened, and with the foliage clustered in thick tufts at their extremities" (Veitch).

Other varieties of *P. Laricio* are: *compacta, contorta, nana,* and *pendula.*

FIG. 178. BRANCH OF PINUS LONGIFOLIA, with Male Catkins.

P. longifolia (long-leaved). *l.* in threes, 12in. to 14in. long, very slender, three-edged, of a bright glossy green, finely serrated, pendulous. *cones* either singly or in clusters varying from three to five in number, in regular whorls, 5in. long, and 2½in. to 3in. in circumference near the base, ovate, very smooth, glossy, and hard; scales much thickened at the ends, and with a large, thick, hooked beak. Bark rough. Branches irregularly and thinly scattered. *h.* 60ft. to 100ft. India. Greenhouse. See Fig. 178.

P. Loudoniana (Loudon's). *l.* in fives, 5in. to 6in. long, angular on the inner face. *cones* quite straight, tapering to the point, 12in. to 14in. long, 3in. to 4in. in diameter; seeds very large, with broad wings 1in. long. Branches in whorls, slender and horizontal; lateral ones long, very slender, divided and drooping. *h.* 140ft. Mexico. The timber of this tree is highly esteemed, being of excellent quality. Hardy in the West of England. SYN. *P. Don Pedri.*

P. macrocarpa (large-fruited). A synonym of *P. Coulteri.*

P. maritima (sea). A synonym of *P. Pinaster.*

P. Massoniana (Masson's). *l.* deep green, twisted, 4in. to 6in. long, rounded or convex above, channelled beneath; edges slightly scabrous. *cones* very small. *h.* 70ft. to 80ft. Japan, 1854. Closely allied to *P. densiflora*, but attaining a greater height, with branches longer and more spreading, and the branchlets stouter. (S. Z. F. J. 113, 114.)

P. monophylla (one-leaved). *l.* rigid, glaucous-green, curved, from 2in. to 3in. long. *cones* from 2in. to 3in. long, without scales. Branches numerous and slender. *h.* 20ft. to 25ft. California, 1847. A small, slow-growing species, with a dense, bushy head. SYN. *P. Fremontiana.* (G. C. n. s., XX. 44.)

FIG. 179. BRANCH OF PINUS PINASTER.

P. Montezumæ (Montezuma's). *l.* in fives, 3in. to 4in. long, rather stout, rigid, three-edged, and rough at the angles, supported by long, sharp-pointed, brown scales at the base of the sheaths, which are persistent, and nearly ¼in. long. *cones* in clusters of three or four together, but often single, nearly horizontal, 4in. to 5in. long, 1¾in. broad, tapering at both ends. Branches few, irregular, rather stout and twisted. *h.* 40ft. Mexico. Hardy in the South and West of England. (J. H. S. i. 235.)

P. monticola (mountain-top).* *l.* glaucous, triquetrous, the edges slightly scabrous, about 3in. long, the points blunt; sheaths short. *cones* 5in. to 6in. long, tapering to a sharp point. Branches whorled. *h.* 75ft. to 100ft. North California, 1831. A handsome, pyramidal-growing tree, with an erect trunk. It is closely allied to *P. Strobus*, but the leaves are shorter, and more rigid.

P. Mughus (Mughus). *l.* dark green, crowded, stiff, short, twisted, about 2in. long. *cones* usually in pairs, small, ligneous, ovoid, about 1½in. long; scales with a strong, usually curved spine. Upper branches ascending or erect; lower ones generally decumbent. *h.* 5ft. to 15ft. Mountains of Central Europe, 1779. A densely-branched tree or shrub. SYNS. *P. carpatica* and *P. Pumilio*. *P. montana*, by some botanists regarded as a distinct species, very nearly resembles *P. Mughus.*

P. M. nana (dwarf). Knee Pine. A small form, rarely above 2ft. in height.

P. muricata (prickly-coned). *l.* bright green, pliant, crowded, convex on one surface, and somewhat concave on the other, blunt, with rough edges, and short, pale sheaths, 3in. to 5in. long. *cones* clustered, about 3in. long, very dense and woody, often oblique; lower scales prominent, furnished with a sharp, woody

Pinus —*continued.*

point. Branches not numerous. *h.* 25ft. to 50ft. (rarely 80ft. to 120ft.). California, 1846. A distinct species, with a somewhat irregular growth.

P. Murrayana (Murray's). A synonym of *P. contorta Murrayana.*

P. nigra (black). A synonym of *P. austriaca.*

P. Parryana (Parry's). A synonym of *P. ponderosa.*

P. parviflora (small-flowered).* *l.* silvery on the flattened or inner sides, rigid, crowded, slightly twisted, 1in. to 1½in. long. *cones* ovate-elliptic, 2½in. to 3½in. long; scales leathery, broadly wedge-shaped. Branches approximate, horizontal or slightly ascending; branchlets numerous, short, tufted. *h.* 25ft. to 40ft. Japan, 1861. A distinct, small-growing species, having a well-furnished trunk and dense foliage. (G. C. n. s., x. 624.)

P. Pinaster (Pinaster).* Cluster Pine. *l.* dark green, stiff, broad, stout, from 6in. to 12in. long. *cones* about 4in. long, in dense clusters, yellowish-brown; scales pyramidal, angular, with a short, straight prickle; seeds winged. *h.* 60ft. to 80ft. South-west Europe, 1596. A beautiful tree, of variable habit, and succeeding best near the sea. It is, perhaps, the most uncertain of all the *Coniferæ* to remove, on account of its long, bare roots. Two-year-old seedlings seldom strike when removed, it being absolutely necessary to procure seedlings which have been transplanted when a year old, and have stood in the nursery for another year. When the seed is sown, however, where the trees are intended to stand, in deep, dry sand, they do very well. SYN. *P. maritima.* See Fig. 179. (Sy. En. B. 1381.)

P. P. Hamiltoni (Hamilton's). Lord Aberdeen's Pine. An elegant variety, with shorter and paler green leaves than the type. Nice, 1825.

P. P. variegata (variegated) more or less variegated with yellow and green.

FIG. 180. PINUS PINEA.

P. Pinea (Pine).* Parasol Pine or Stone Pine. *l.* deep green, semi-cylindrical, rather rigid, with the edges slightly scabrous, about 6in. long. *cones* from 4in. to 6in. long, and 3in. in diameter; scales stout, ligneous, hard, terminating in a recurved, obtuse prickle; seeds with a very small wing. Branches spreading; branchlets generally ascending, and confined to the top of the tree. *h.* 50ft. to 60ft. Mediterranean region, 1548. This very picturesque tree thrives best in a sandy soil, near the sea, in a sheltered situation: it is somewhat tender, not being able to stand exposure to cold blasts of wind. In Italy, the seeds, which are larger in size than those of any other European Pine, are sold as a fruit, of which the natives are uncommonly fond. See Fig. 180. (G. C. n. s., xx. 45.)

Pinus—*continued.*

P. ponderosa (heavy-wooded).* *l.* deep glaucous-green, rather rigid, three-angled, compressed, with roughish edges, from 6in. to 12in. long, sometimes twisted, confined to the extremities of the branches. *cones* ovoid, 3in. to 6in. long; scales terminating in a short spine. Branches regularly whorled, at first horizontal, afterwards decumbent. *h.* 100ft. to 150ft. and upwards. California, 1827. A very large tree, the bark of which is divided into large, flat, smooth plates, 4in. to 8in. broad. SYNS. *P. Benthamiana* (F. d. S. iv., p. 216; vi., p. 85), *P. Parryana*, and *P. Sinclairiana.*

P. p. Jeffreyi (Jeffrey's). *l.* glaucous-green, rigid, spreading, about 9in. long. *cones* large and handsome, 8in. to 9in. long, tapering, more developed above than beneath, yellowish-brown; scales closely adherent, with a projecting spine. *h.* 150ft. Oregon and California, 1852.

P. Pumilio (Pumilio). A synonym of *P. Mughus.*

FIG. 181. CONE OF PINUS PUNGENS.

P. pungens (pricking). Table Mountain Pine. *l.* in twos, 2in. to 2½in. long, pale yellowish-green, straight, rigid, thickly set on the branches. *cones* top-shaped, rather large, light yellowish-brown, 3½in. long, 2½in. broad at the base, tapering to a point, generally in whorls round the stem and top branches; scales thick, hard, broad at the base, elevated into a pyramid, with an incurved, strong, awl-shaped hook. Branches irregular and spreading; buds blunt, covered with resin. *h.* 40ft. to 50ft., resembling the Scotch Fir in habit. Mountains of Southern United States. See Fig. 181.

FIG. 182. CONE OF PINUS PYRENAICA.

P. pyrenaica (Pyrenean). *l.* thin, smooth, dense, about 4in long, the edges slightly scabrous. *cones* about 2½in. long slightly curved, and tapering to a point. Branches numerous, with the branchlets close-set. *h.* 60ft. to 80ft. Pyrenees, 1834. A handsome species, of rapid growth, and with a regular pyramidal outline. See Fig. 182. (R. H. 1867, 16.)

P. p. brutia (Brutia). "A medium-sized tree, with spreading branches, and slender, wavy leaves, 9in. long" (Veitch). Italy. See Fig. 183.

P. radiata (rayed). A synonym of *P. insignis.*

Pinus—*continued.*

FIG. 183. BRANCH OF PINUS PYRENAICA BRUTIA.

P. rigida (stiff). *l.* light green, rigid, triquetrous, with roundish edges, sharp-pointed, from 3in. to 5in. long. *cones* ovoid, about 3in. long; scales terminating in sharp, hooked prickles. *h.* 70ft., but only from 30ft. to 45ft. in England. Eastern United States, 1759. This species is much branched at the top, and forms a dense head.

FIG. 184. CONE OF PINUS SABINIANA (much reduced).

P. Sabiniana (Sabine's). *l.* glaucous-bluish-green, rather flaccid, pendulous, slightly twisted, rounded on the outer, and with a prominent rib on the inner, side. *cones* from 7in. to 9in. long, 5in. to 7in. in diameter, very resinous; scales hard, strong, large, terminating in a sharp, hard, solid point. Branches horizontal, usually having a bare appearance. *h.* 40ft. to 60ft. California, 1832. "In England, it is tolerably hardy, but somewhat fastidious as to soil and situation. In favourable spots, where it has attained a considerable size, it proves to be a very distinct, and by no means inelegant, tree, its long, pendulous leaves and slender but crooked branches being notable characteristics; but all defects are amply atoned for by its fine cones, which almost rival those of *P. macrocarpa* [*P. Coulteri*] in size and colour" (Veitch). See Fig. 184.

P. Sinclairiana (Sinclair's). A synonym of *P. ponderosa.*

Pinus—*continued.*

P. Strobus (Strobus).* Weymouth Pine. *l.* light green, marked with silvery lines, slender, soft, 3in. to 5in. long. *cones* cylindrical, tapering, slightly curved, 6in. to 8in. long; scales smooth, thickened at the apex. Branches often short. *h.* 120ft. to 160ft. North America, 1705. A handsome tree, but inferior

FIG. 185. PORTION OF BRANCHLET, WITH TWO CLUSTERS OF LEAVES, OF PINUS STROBUS.

to *P. excelsa*, to which it is very closely allied. See Fig. 185. The variety *nana* is a small, compact, bushy shrub, with short, slender branches and numerous branchlets. The leaves are shorter than those of the species, and densely clustered at the extremities of the branchlets. There are several other but inferior varieties.

FIG. 186. CONE OF PINUS SYLVESTRIS.

P. sylvestris (sylvan).* Deal Wood; Fir-tree; Scotch or Wild Pine. *l.* dense, of a glaucous hue, from 1½in. to 2in. long, but shorter on old trees; sheaths small, persistent, nearly black. *cones* solitary or two or three together, about 2in. long, tapering towards the apex; tops of the scales elevated and ridged, with a square or triquetrous outline, and a small shield with a

FIG. 187. BRANCHLET AND CONES OF PINUS SYLVESTRIS.

Pinus—*continued.*

deciduous point; seeds winged. Branches spreading, short, the lower ones dying off when in a young state. *h.* 50ft. to 100ft. Britain. A well-known tree, of which there are several varieties of little value. It grows best in a peaty soil, where the Heath acts as cover, and affords protection to the young plant, which is better adapted for it than close herbage. When shifted to different soil, the quality of the tree often degenerates, and the wood becomes whiter and softer than in the original type. See Figs. 186 and 187. (Sy. En. B. 1380.)

P. s. altaica (Altaian). A compact, pyramidal tree, with much shorter and stiffer leaves. *h.* 50ft. Altai Mountains.

P. s. argentea (silvery). Cones and leaves of a beautiful silvery hue.

FIG. 188. PINUS SYLVESTRIS FASTIGIATA.

P. s. fastigiata (pyramidal). A form only differing from the type in its columnar habit. See Fig. 188.

P. s. horizontalis (horizontal). *l.* broader and more glaucous than in the type. *cones* thicker, less pointed. Branches quite horizontal.

P. s. latifolia (broad-leaved). A robust and rapid-growing form, having much broader, more glaucous, and longer leaves than any other variety of *P. sylvestris*.

P. s. monophylla (one-leaved). A singular variety. The leaves are "attached to each other throughout their length, and have the appearance of being united; but by giving them a twist, they separate into two, like the ordinary Scotch Fir" (Gordon, "Pinetum").

Pinus—*continued.*

P. s. variegata (variegated). *l.* variegated with pale straw-colour.

P. tuberculata (tubercled). *l.* deep green, triquetrous, with an elevated rib running along the middle on the under side, twisted, the edges scabrous. *cones* varying in size, from 4in. to 8in. long; scales very prominent, deeply divided from each other. *h.* 25ft. to 40ft. California, 1847. A handsome species when in a young state.

Several species, not mentioned in the foregoing list, are occasionally seen in cultivation, but they are, as a rule, too tender for our climate; and several others are of no horticultural value.

PIONANDRA. A synonym of **Cyphomandra** (which *see*).

PIONEA FORFICALIS (Garden Pebble Moth). An insect living, in the larval state, on the leaves of Cabbages and Horse-radish, as well as on Hedge Mustard and other uncultivated *Cruciferæ*. The moth is common throughout the country. It is a little over 1in. in spread of wings. The front wings are rather pointed at the tip, and in colour are dull straw-yellow, shaded with pale brown; a brown line runs from the tip to the middle of the inner margin, and another nearly parallel to it, but paler brown, crosses the middle of the wing, widening towards the front margin into a dark, ill-defined spot. There are also one or two other less distinct lines, running in the same general directions with these. The body is pale, shining straw-yellow in colour, as are also the hind wings, which have a brown marginal line, and a brown line running parallel with it. The larva has six true legs and ten prolegs; it is yellowish-green, with a darker green line down the middle of the back, and one along each side, bordered above with a white line. The head is brown. There are usually two broods in the year. Some moths emerge in May. They lay eggs, and from these emerge larvæ, which feed on the plants named above, usually between the leaves, under protection of a thin web of threads. They turn, in the soil, into pupæ, from which moths emerge about August. These produce a new brood of larvæ, which feed up in autumn, to become moths in the following May. The damage done by the moths is seldom serious, though the larvæ are troublesome in often being boiled between the leaves of Cabbages and served at table. The only practicable remedies are picking off the larvæ and catching and killing the moths.

PIONY. *See* **Pæonia.**

PIOPHILA APII (Celery-stem Fly). A fly which has been described by Professor Westwood, in the "Gardeners' Chronicle," as injurious to Celery. The yellowish-white maggots burrow, during winter and spring, in the stems, eating their way upwards, and leaving burrows of a rusty-red colour in the tissues. They are blunt behind, but taper in front, and have two black hooks in the front end. The maggots change into pupæ in the stem, and the flies emerge in May. They are of a glossy black colour, with a coat of golden-grey hairs; the head is chestnut-brown, with a black apex; the two wings are clear, with yellow veins; and the legs are straw-coloured, with dusky feet. The spread of wings is a little over ⅓in., the length of head and body hardly ¼in.

Remedy. The only useful remedy seems to be the burning of all plants showing signs of disease, to prevent the injury from spreading.

PIPER (old Latin name, akin to the Greek *Peperi*, and Sanscrit *Pippala*). Pepper. Including *Artanthe*, *Chavica*, *Cubeba*, *Pothomorphe*, &c. ORD. *Piperaceæ*. A vast genus (upwards of 600 species have been described) of stove, rarely nearly hardy, shrubs, sometimes climbing, rarely trees or tall herbs, with branches often articulated at the nodes; they are broadly dispersed over the warmer regions of the globe, and are very numerous in tropical America. Flowers hermaphrodite or unisexual, densely cylindrical-spicate or rarely sub-racemose, subtended by peltate, adnate, or concave bracts; perianth none;

Piper—*continued.*

stamens two to four, rarely five or many; spikes pedunculate or rarely sub-sessile. Leaves alternate, entire or (in one species) trifid, stalked; stipules adherent to the leaf-stalk, or opposite, and deciduous. Few of the species have any horticultural importance, but some of them are of great economic value. The Pepper of commerce (*P. nigrum*) is imported in enormous quantities. It is also employed as an acrid stimulant in cases of impaired digestion, and it has been recommended, in cases of ague, to prevent the paroxysm. *P. nigrum* and the rest of the stove species grow freely in a well-drained, rich, loamy soil. The others thrive in almost any soil, in a cooler temperature. All are propagated by cuttings of the half-ripened shoots, inserted in sandy soil, under a bell glass.

Piper—*continued.*

P. Betle. Betel Pepper. *fl.*, catkins opposite the leaves, peduncled, greatly enlarged in fruit, pendent. *l.* alternate, distichous, cordate-ovate, 4in. to 7in. long, acuminated at apex, oblique at base; petioles rounded, stipuled when young. Stems trailing or climbing to a great height. East Indies, 1804. Stove. This species yields the Betel Leaf of the South Asiatics—almost as extensive an article of commerce as Tobacco is in the West. (B. M. 3132.)

FIG. 189. BRANCH OF PIPER PORPHYROPHYLLUM.

P. borneense (Bornean). *l.* large, of a rich dark green, with broad but faint silvery-grey stripes between the eleven nerves, rugose and glabrous above, hairy-pubescent beneath. Stem thick, hairy. Borneo, 1882. A dwarf, stove, herbaceous species.

P. decurrens (decurrent).* *l.* green, shaded with metallic iridescence, large. Stem stout, pale green, mottled with white spots and black lines. Columbia, 1876. A distinct and splendid stove plant. (I. H. 239.) SYNS. *Artanthe decurrens* and *A. magnifica.*

P. excelsum aureum-pictum (tall, golden-painted).* *l.* with a large, creamy blotch, broadly ovate-cordate, acuminate, 3in. to

Piper—*continued.*

5in. long; petioles 1in. to 2in. long, winged by the adnate stipules at their bases. New Zealand. A very aromatic, greenhouse bush or small tree.

P. Futokadsura (Futokadsura).* *fl.* greenish, succeeded by bright red fruit. *l.* ovate-lanceolate, acuminate, entire, about 3in. broad, glabrous. Branches slender. Japan, 1869. A remarkable, nearly hardy, deciduous shrub, very like *P. nigrum.*

P. nigrum. Black, or Common Pepper. *fl.*, catkins 3in. to 6in. long. *fr.* first green, then red, afterwards black. *l.* 4in. to 6in. long, alternate, distichous, broadly ovate, acuminate; petioles rounded, ½in. to nearly 1in. long. Stem trailing or climbing, flexuous. East Indies, 1790. The fruit of this species forms the well-known condiment. White Pepper is the same fruit, but deprived of its external coat. (B. M. 3139; B. M. Pl. 245.)

P. porphyrophyllum (purple-leaved).* *l.* cordate-orbicular, shortly cuspidate, 4in. to 6in. long, 3½in. to 5in. broad, rich deep bronzy-green above, beautifully marked with numerous, small, pink spots, which are thickly clustered along the course of the nerves, and a few scattered between them; under surface dull purple. Malay Peninsula (?). Stove climber. See Fig. 189. (F. d. S. 1491; R. H. 1883, 560.) SYN. *Cissus porphyrophyllus*, of gardens.

P. rubronodosum (red-noded). *l.* deep sap-green, when young frosted over with silver-grey; petioles pubescent. Stems fleshy, scabrous, red at the nodes. Columbia, 1877. A distinct, stove shrub.

PIPERACEÆ. A natural order of herbs, shrubs, or very rarely trees, often aromatic or stimulant, broadly dispersed over the globe. Flowers hermaphrodite or unisexual, small, often minute, variously disposed, scattered or dense, in spikes or rarely racemes, and furnished with a frequently peltate bract; perianth (except in one genus) absent; stamens two to six, or very rarely seven or eight (or one?), hypogynous; filaments free, or rarely adnate to the base of the ovary. Fruit small, capsular or baccate. Leaves alternate, or rarely opposite or three or four in a whorl, entire or very rarely trifid, three or many-nerved, or penniveined, sometimes pellucid-dotted or succulent; stipules, when present, adnate to the petioles, or dilated at base and reduced to an amplexicaul petiole, or connate and opposite the leaves. Among the most important economical products of *Piperaceæ* are Pepper and Betel. An acrid resin and a volatile, aromatic oil are possessed by the plants. The order comprises about eight genera and nearly 1000 species. Illustrative genera are: *Houttuynia*, *Peperomia*, and *Piper*.

PIPERELLA. A synonym of **Micromeria** (which *see*).

PIPE-TREE. *See* **Syringa vulgaris.**

PIPEWORT. *See* **Eriocaulon.**

PIPPERIDGE, or **PIPRAGE.** A common name for *Berberis vulgaris.*

PIPTADENIA (from *pipto*, to fall, and *aden*, a gland; referring to the falling gland of the anthers). ORD. *Leguminosæ.* A genus comprising about thirty species of unarmed or prickly, stove shrubs or trees, two of which are natives of tropical Africa, and the rest inhabit the warmer regions of America. Flowers white or greenish, small, uniform, hermaphrodite or subpolygamous, sessile or pedicellate, disposed in cylindrical spikes or globose heads; peduncles axillary, solitary or fasciculate, the uppermost ones at the tips of the branches, often paniculate. Pods stipitate or rarely sessile, broadly linear, flat, membranous or coriaceous. Leaves bipinnate; leaflets small and many-jugate, or rarely large and few-jugate. For culture of the species described below, *see* **Adenanthera.**

P. latifolia (broad-leaved). *fl.* spicate; spikes shorter than the leaves, axillary or in terminal panicles. *l.* bipinnate, tri- or quadri-jugate, glabrous, often slightly glaucescent beneath; leaflets two, three, or many-jugate, obovate-elliptic, slightly acute. *h.* 4ft. Brazil, &c., 1820.

PIPTANTHUS (from *pipto*, to fall, and *anthos*, a flower; the teeth of the calyx, as well as the petals and stamens, very soon fall off). ORD. *Leguminosæ.* A monotypic genus, the species being a very handsome, hardy or nearly hardy, evergreen shrub. It thrives best

Piptanthus—*continued.*

in a rich sandy loam, and in exposed parts should have the protection of a wall. Propagated by seeds; by cuttings of the ripened shoots, inserted under a hand light; and by layers.

P. nepalensis (Nepaulese).* Evergreen Laburnum. *fl.* yellow, large, in terminal, bracteate racemes; standard orbicular, slightly exceeding the wings, the sides reflexed; wings oblong-obovate; keel as long as, or longer than, the wings, scarcely incurved; petals connate at the base. Spring. *l.* alternate, petiolate, digitately trifoliolate; leaflets lanceolate, acute, slightly hairy; stipules united in one, opposite the leaves. *h.* 10ft. Temperate Himalaya, 1821. (S. B. F. G. 264; H. E. F 131, under name of *Baptisia nepalensis.*)

PIPTOCLAINA. Included under *Heliotropium.*

PIPTOSPATHA (from *pipto*, to fall, and *spathe*, a spathe; after fertilisation, the top of the spathe falls off like an extinguisher). ORD. *Aroideæ* (*Araceæ*). A monotypic genus. The species is a stove, herbaceous, tufted, stemless perennial, of little other than botanical interest. It thrives best in a well-drained compost of rich, sandy loam, fibry peat, and leaf mould. A very moist atmosphere is essential. Propagated by divisions, or by seeds.

P. insignis (remarkable). *fl.* white, tinted with pink, 1½in. long, convolute, ovate-fusiform; spadix half as long as the spathe, sessile; peduncles longer than the petioles, slender, decurved at apex. Summer. *l.* numerous, nearly 6in. long, lanceolate, coriaceous, cartilaginously margined, slightly dotted beneath; petioles much shorter than the leaves, sheathing at base. Borneo, 1879. (B. M. 6598; G. C. n. s., xi., p. 139.)

PIQUERIA (named after A. Piqueria, a Spanish botanist, who published a translation of Hippocrates in 1757). Including *Phalacræa.* ORD. *Compositæ.* A genus comprising about half-a-score species of greenhouse or hardy shrubs, or rarely erect annual or perennial herbs, natives of mostly Western South America, from Bolivia to Mexico. Flower-heads white or bluish, small, homogamous, often densely cymose, the cymes corymbose or loosely paniculate; involucre campanulate; receptacle flat or convex, naked. Leaves opposite, toothed or entire. The only species known to cultivation are the two described below. Both are hardy, and of easy culture in ordinary garden soil. *P. latifolia* may be increased by seeds, and *P. trinervia* by division.

P. latifolia (broad-leaved). *fl.-heads* purplish, pedicellate; peduncles almost naked, corymbose at apex. July. *l.* petiolate broadly ovate, truncate at base. *h.* 1½ft. Peru, 1800. Annual. (R. G. 107.) SYNS. *Ageratum latifolium*, *Phalacræa cœlestina.*

P. trinervia (three-nerved). *fl.-heads* white, disposed in loose, corymbose, many-headed panicles. July. *l.* ovate or oblong-lanceolate, sub-serrate, trinerved. *h.* 2ft. Mexico, 1798. Glabrous perennial herb. (B. M. 2650.)

PIRIGARA. A synonym of **Gustavia** (which *see*).

PIRIQUETA. Included under **Turnera** (which *see*).

PIRONNEAUA. Included under *Æchmea.*

PISAURA. A synonym of **Lopezia** (which *see*).

PISCIDIA (from *piscis*, a fish, and *cædo*, to kill or destroy; the leaves, bark, and twigs, are bruised, and thrown into ponds or rivulets, for the purpose of intoxicating fish, by which means they are easily taken). Fish Poison-tree; Jamaica Dogwood. ORD. *Leguminosæ.* A monotypic genus, the species being a stove, evergreen tree, having the flowers, foliage, and habit, of *Lonchocarpus*, but the pod bears four projecting, longitudinal wings. The species requires a compost of sandy, fibry loam. Cuttings of half-ripened shoots will root in sand, under a glass, in heat.

P. erythrina (red). *fl.* white and mixed with blood-colour, above ½in. long, appearing before the leaves; calyx teeth broadly triangular; standard silky-hoary outside, the claw almost equalling the calyx; panicles lateral, sometimes ovate and dense-flowered, scarcely 3in. long, sometimes elongate-thyrsoid, 6in. to 12in. long. May. *l.* alternate, pinnate, exstipellate; leaflets seven to eleven, oval, obovate, or broadly oblong, obtuse or shortly acuminate, at length coriaceous, 2in. to 4in. long, on stalks ¼in. long. *h.* 30ft. West Indies, 1690.

PISIFORM. Resembling a Pea in shape.

PISONIA (named in honour of Willem Piso, of Amsterdam, an eminent physician and writer on natural history, who died in 1648). SYNS. *Calpidia, Ceodes, Columella, Pallavia,* and *Torrubia.* ORD. *Nyctagineæ.* A genus consisting of about sixty species of unarmed or rarely spiny, glabrous or pubescent, erect or rarely sub-scandent, stove or greenhouse trees and shrubs, mostly natives of tropical America; a few are found in Asia and the Pacific Islands, and six in the Mascarene Islands. Flowers pink, greenish, or yellow, small, disposed in paniculate, sub-sessile, or pedunculate cymes, two or three-bracteolate; male perianth tubular- or infundibular-campanulate, female large and oblong; limb of five short teeth or lobes. Fruit a small or rather large, elongated utricle. Leaves opposite or scattered, sessile or petiolate, oblong, ovate, or lanceolate, entire. A few of the species are known to cultivation, but they have very little to recommend them to gardeners. Those described below thrive in well-drained loam. Propagation may be easily effected by cuttings, inserted in similar soil.

P. aculeata (prickly). West Indian Cockspur. *fl.* greenish, in small, dense cymes or globular clusters. March. *fr.* in loose cymes, often forming large panicles. *l.* opposite or here and there alternate, petiolate, ovate, often broad, or rarely oblong or lanceolate, obtuse, entire, rarely exceeding 3in., and often less than 2in. long. *h.* 10ft. Tropics, 1806. A tall, woody, greenhouse climbing shrub, often armed with stout, recurved, axillary prickles.

P. grandis (grand). A synonym of *P. inermis.*

P. inermis (unarmed). *fl.* greenish, collected in small cymes, forming a terminal, rather corymbose panicle, usually shortly pedunculate. March. *l.* petiolate, ovate or oblong, acuminate or almost obtuse, rounded or narrowed at base, often 6in. to 8in. long. *h.* 10ft. Australia, 1806. A small, greenhouse tree. SYN. *P. grandis.*

P. obtusata (obtuse). *fl.* greenish, shortly pedicellate; cymes stalked, terminal. April. *l.* obovate or obovate-oblong, rounded at the tip, and tapering towards the petiole, glabrous or pubescent. *h.* 4ft. West Indies, 1824. Stove shrub.

PISSODES. A small genus of beetles, included under the large group of Weevils (*Curculionidæ*). The species are few, and are much alike in size and appearance. All feed, both as larvæ and as perfect insects, on coniferous trees. An account of their ravages is given under the heading of **Pine Weevils.**

PISTACHIO OR PISTACIA NUT-TREE. *See* **Pistacia vera.**

PISTACIA (from *Pistake,* the old Greek name, used by Theophrastus, and that from the Persian *Pista*). SYN. *Terebinthus.* ORD. *Anacardiaceæ.* A genus comprising half-a-dozen species of hardy, small-growing trees, five of which are natives of the Mediterranean region, from Western Asia to the Canary Islands, and the sixth Mexican. Flowers small, apetalous, dicœcious, disposed in axillary panicles or racemes; pedicels bracteate at base. Fruit a one-seeded, dry drupe. Leaves alternate, perennial or deciduous, trifoliolate or pari- or impari-pinnate. *P. Lentiscus, P. Terebinthus,* and *P. vera,* are trees of great economic value. The species in cultivation thrive best in a rich, deep, sandy loam, and against a wall. Propagated by layers, or by cuttings.

P. atlantica (Atlantic). *fl.* in loose, panicled racemes; anthers deep red. *l.* impari-pinnate; leaflets usually nine, tapering to the base. *h.* 40ft. Canaries, 1790. Evergreen.

P. Lentiscus (Lentiscus). Mastich-tree. *fl.* green, on loose racemes, which issue from the sides of the branches. Spring. *l.* abruptly pinnate; leaflets eight, lanceolate; petioles winged. *h.* 20ft. South Europe, 1664. Evergreen. This plant yields the drug known as "mastich." (B. M. Pl. 63.) The variety *angustifolia* has almost linear leaflets; whereas in the form known as *Chia* they are ovate.

P. Terebinthus (Terebinthus). Turpentine-tree. *fl.* greenish, disposed in large, compound panicles; anthers dull yellow; stigmas crimson. June. *l.*, leaflets usually numerous, ovate-lanceolate, rounded at the base, acute and mucronate at the apex. *h.* 30ft. South Europe, 1656. Deciduous. The red hue of the young leaves of this species is very beautiful. The resin, the Chian or Cyprus turpentine, is obtained from this tree, the liquid flowing from incisions made in the trunk. (B. M. Pl. 69.)

Pistacia—*continued.*

P. vera (true). Pistachio Nut-tree. *fl.* brownish-green. April. *fr.* panicled, about 1in. long, ovate, with an oblique point, reddish. *l.* pinnate; leaflets ovate, tapering a little to the base, rather mucronate at the apex. *h.* 20ft. Syria, 1770. Deciduous.

PISTIA (probably from *pistos,* watery; in reference to the habitat). SYNS. *Apiospermum, Limnonesis, Zara.* ORD. *Aroideæ* (*Araceæ*). A monotypic genus. The species is an ornamental, stove aquatic, requiring plenty of heat. It increases rapidly, and often completely coats tropical ponds and water-tanks with verdure, keeping the water beneath fresh and cool. The plant floats on the water, and sends down many long, feathery roots. Each plant sends out several runners, and upon the ends of these other similar plants are formed, which again send out runners.

P. Stratiotes (Stratiotes).* Tropical Dockweed; Water Lettuce. *fl.* greenish, very small, borne in little spathes at the end of the leaves, each spathe containing one male and one female flower attached to an adnate spadix. *l.* wedge-shaped, slightly concave, notched or round topped, 2in. to 5in. long, of a delicate pale pea-green, covered with fine hairs. Tropics, 1843. (B. M. 4564; F. d. S. 625; L. J. F. 137.)

PISTIL. The female organ in flowers; it consists of ovary, style, stigma, and ovules, or at least of ovary and stigma.

PISTORINIA. Included under **Cotyledon** (which *see*).

PISUM (the old Latin name, used by Virgil, akin to the Greek *Pison*). Pea. ORD. *Leguminosæ.* A genus comprising only a couple of species of diffuse or climbing, hardy, annual herbs, one of which is much cultivated, and is here and there naturalised, in the Mediterranean region and in Western Asia, and the other is a native of the Taurian Mountains. Flowers purple, rose, or white, showy; peduncles axillary, elongated, solitary or a few racemose; calyx lobes sub-equal, or the two upper ones broader; standard broadly obovate or sub-orbicular; wings falcate-oblong, longer than the keel. Pods compressed, obliquely acute, bivalved. Leaves pinnate; common petiole terminating in a bristle or tendril; leaflets one to three-jugate. *P. elatius* requires similar treatment to **Lathyrus** (which *see*). For culture, &c., of *P. sativum, see* **Pea.**

P. elatius (tall). *fl.* pale red, with the lamina of the wings dark purple; peduncles two-flowered, erect, longer than the leaves. June to September. *l.*, petioles terete, bearing six lanceolate-oblong leaflets; stipules rounded and crenated below. Stems erect. Iberia, 1820. Climber.

P. sativum (cultivated). *fl.* white or red; peduncles two or many-flowered. June to September. *l.*, petioles terete, bearing three pairs of ovate, entire, glaucous leaflets, with undulated margins, usually opposite and mucronulate; stipules ovate, somewhat cordate, crenated at the base. South Europe. A climber, of which there are several varieties, including *arvense, humile* (Dwarf Pea), *macrocarpum, quadratum, saccharatum* (Sugar Pea), and *umbellatum* (Crown Pea).

PITCAIRNIA (named after W. Pitcairn, a physician, of London). SYN. *Hepetis.* Including *Neumannia* and *Pepinia.* ORD. *Bromeliaceæ.* A genus comprising about seventy species of stove perennial herbs, rarely shrubs, generally stemless, with the leaves in a dense rosette; they are all natives of tropical America. Flowers red, yellow, or whitish; calyx with a short, obconical tube, adnate to the base of the ovary, and three large, lanceolate segments; corolla of three lingulate, unguiculate petals, one and a-half to three times the length of the sepals, usually with two minute scales at the base; stamens six; peduncle leafy, the proper leaves passing gradually into bracts; inflorescence generally a simple or panicled raceme, rarely a head or sub-spicate raceme. Leaves linear or ensiform, rarely oblong, lepidote on the back, or green and naked on both surfaces, often prickle-margined, especially towards the base, sessile or narrowed into a channelled petiole. All the species described below are herbaceous perennials, except where otherwise stated. For culture, *see* **Æchmea** and **Billbergia.** The following enumeration of species is based on Mr.

Pitcairnia—*continued.*

Baker's synopsis of the genus, which appeared in "Trimen's Journal of Botany," 1881.

P. albiflos (white-flowered). *fl.* in a simple, loose raceme, 6in. to 12in. long; petals white, three times as long as the sepals; peduncle 1ft. to 2ft. long. September. *l.* many to a tuft, linear, 1½ft. to 2ft. long, ½in. to ¾in. broad at the middle, obscurely petioled, without prickles. Rio Janeiro, 1826. (B. M. 2642.) SYN. *P. odorata* (R. G. 1855, 114).

P. alta (tall). *fl.*, sepals and petals bright red, the latter 2in. long, ½in. broad; racemes several, arranged in a deltoid panicle, 2ft. long and broad; peduncle 2ft. to 3ft. long, floccose. August. *l.* twelve to twenty to a stem, linear, 2ft. to 3ft. long, ¾in. to 1in. broad above the middle, spine-edged towards the base. Dominica, before 1877. (B. M. 6606.) This species is known in gardens by the following names: *P. bromeliæfolia*, *P. intermedia*, and *P. Skinneri*.

P. Altensteinii (Altenstein's). *fl.* in a simple, sub-spicate raceme, 4in. to 6in. long; sepals 1in. to 1¼in. long; petals whitish, twice as long as the sepals; bracts bright red, 1½in. to 2in. long; peduncle 1ft. to 1½ft. long. May. *l.*, produced ones about ten to a stem, 2ft. to 3ft. long, 1½in. to 2in. broad, with an unarmed or minutely prickly petiole. Western Venezuela, 1840. (F. d. S. 162.) SYNS. *P. undulatifolia* (B. M. 4241), *Puya Altensteinii*.

P. A. gigantea (gigantic). A very large form, with an inflorescence 6ft. to 7ft. high, including the peduncle. (B. M. 4309; F. d. S. 253, 254.)

FIG. 190. PITCAIRNIA ANDREANA, showing Habit, detached Flower, and Portion of Leaf to show the Scales.

P. Andreana (André's).* *fl.* in a simple raceme, 4in. to 6in. long; petals yellow at the tip, red lower down, four times as long as the sepals; peduncle 4in. to 6in. long, densely leafy. July. *l.*, produced ones four or five to a stem, lanceolate, not distinctly petioled, 16in. to 20in. long, 1in. to 1½in. broad, white beneath, lepidoted above. New Grenada and Venezuela, 1872. See Fig. 190. (B. M. 6480; I. H. n. s. 139.) SYN. *P. lepidota*.

P. angustifolia (narrow-leaved). *fl.* in one to three racemes, the end one 6in. to 9in. long; petals 1½in. to 1¾in. long, bright red, scaled at base; peduncle, including inflorescence, 2ft. to 3ft. long. September. *l.* linear, about 2ft. long, ½in. to ¾in. broad, acuminate, not petioled, white-furfuraceous at back, armed down the margins with brown, horny spines. Santa Cruz, 1777. (B. M. 1547.)

P. aphelandræflora (Aphelandra-flowered).* *fl.* in a dense, oblong, sub-spicate raceme, 4in. to 6in. long; sepals coral-red, ½in. long; petals bright red, 2½in. long; lower bracts 2in. to 3in. long. Summer. *l.* thirty to sixty, extending over 3in. to 6in. of the stem, linear, sessile, about 6in. long, less than ¾in. broad, minutely serrulate. Stems slender, 1ft. long below the leaves. Para, 1867. Shrub. SYN. *Pepinia aphelandræflora* (I. H. n. s., xxxii. 5).

P. atrorubens (dark reddish). *fl.* in a simple, sub-spicate raceme, 6in. to 8in. long; petals pale yellow, lingulate, 2½in. to 3in. long; bracts bright red, much imbricated; peduncle leafy, shorter than the leaves. Summer. *l.*, produced ones with a spine-edged petiole, 3in. to 6in. long, and a lanceolate blade, 2ft. to 3ft. long and 2in. to 3in. broad. Central America. SYN. *Puya Warcewiczii* (B. M. 5225).

P. bracteata (large-bracted). *fl.* in a simple, dense raceme, 6in. to 12in. long; sepals nearly 1in. long; petals bright red, decurving, twice as long as the sepals; bracts 1in. to 1½in. long; peduncle nearly 1ft. long, with numerous reduced leaves. April. *l.* in a dense tuft, linear, 1½ft. to 2ft. long, 1in. broad, acuminate, entire or slightly prickly towards the base. St. Vincent, 1799. (B. M. 2813.) SYN. *P. commutata* (R. G. 1867, 557). *P. sulphurea* (A. B. R. 249) is regarded, by Mr. Baker, as a yellow-flowered variety of this species.

Pitcairnia—*continued.*

P. bromeliæfolia (Bromelia-leaved). *fl.* in simple or slightly compound racemes, 1ft. long; sepals and petals bright red, the latter 2in. long; peduncle about 1ft. long below the inflorescence, with several long leaves. June. *l.* in a dense tuft, linear, 2ft. to 3ft. long, ½in. to ¾in. broad at the middle, acuminate, spine-edged towards the base, white-furfuraceous beneath. Jamaica, 1781. (B. M. 824; B. R. 1011.) *P. platyphylla* is regarded, by Mr. Baker, as a robust, broad-leaved variety of this species.

P. bromeliæfolia (Bromelia-leaved), of L'Héritier. A synonym of *P. alta*.

P. cinnabarina (cinnabar-red). *fl.* in dense, simple racemes, about 6in. long; sepals ¾in. long; petals bright red, 2in. long; peduncle 1ft. long, with several reduced leaves. June. *l.*, produced ones linear, sessile, 1½ft. long, scarcely ¾in. broad, quite without spines near the base. Brazil, 1851.

P. commutata (changeable). A synonym of *P. bracteata*.

P. corallina (coral-red).* *fl.* in dense, deflected racemes, above 1ft. long; sepals bright red, 1in. long; petals bright red, edged with white, 3in. long; peduncle also bright red, 1ft. long. Spring. *l.*, produced ones lanceolate, distinctly petioled, 4ft. to 5ft. long, about 4in. broad, spine-edged low down, plicate, white-furfuraceous at back. Choco, New Grenada, about 1874. (B. M. 6600; R. H. 1875, p. 251.)

P. corcovadensis (Corcovado). *fl.* red, disposed in a single, loose, terminal raceme, on a stem about 1ft. high. *l.* erect, glabrous, broadly linear, acuminate, 3ft. to 4ft. long, passing into linear bracts on the flower-stem. *h.* 1ft. Brazil, 1884. A slender species.

P. Decaisnei (Decaisne's). A synonym of *P. fulgens*.

P. densiflora (dense-flowered). *fl.* in a very dense, sub-spicate, oblong raceme, 3in. to 4in. long; petals bright yellowish-red, twice as long as the pale green sepals. Summer. *l.*, produced ones with an unarmed, channelled petiole, 6in. long, and an ensiform, entire blade, 2ft. to 3ft. long, and about 1½in. broad. Native place unknown.

P. echinata (prickly). *fl.* in several loose racemes, arranged in a deltoid panicle; petals whitish, nearly twice as long as the sepals; peduncle 2ft. to 4ft. long below the inflorescence, with eight to ten leaves, the lower 1ft. long. June. *l.*, produced ones twelve to twenty to a stem, lanceolate, 3ft. to 4ft. long, 1in. to 2in. broad, obscurely petioled, white-furfuraceous at back, prickle-margined. *h.* 5ft. to 6ft. New Grenada, 1852. (B. M. 4709; F. d. S. 844; L. J. F. 407.)

P. exscapa (stemless). A synonym of *P. heterophylla*.

P. ferruginea (rusty). *fl.* in ten to twelve secund racemes, arranged in a deltoid panicle, the lower branches of which are 2ft. to 3ft. long; sepals densely ferruginous externally, 2in. to 2½in. long; petals white, twice as long as the sepals, with two large scales at the base; peduncle 2ft. to 3ft. long below the inflorescence. December. *l.* perhaps 100, in a very dense rosette, sessile, 2ft. to 3ft. long, 1½in. to 2in. broad, horny in texture, densely white-lepidote at back. Stem 3ft. to 4ft. long below the rosette of leaves. *h.* 10ft. to 12ft. Andes of Peru, 1860. The largest species of the genus. SYN. *Puya grandiflora* (B. M. 5234).

P. flammea (flame-coloured). *fl.* in a rather dense raceme, 6in. to 12in. long; sepals red, ¾in. long; petals bright red, more than twice as long as the sepals; peduncle also bright red, 1ft. to 1½ft. long, copiously leafy. November. *l.*, produced ones ensiform, 2ft. to 2½ft. long, 1in. to 1¼in. broad, not distinctly petioled, acuminate, persistently white-furfuraceous at back, not at all spiny. Organ Mountains, 1825. (B. R. 1092.)

P. flavescens (yellowish). A synonym of *P. xanthocalyx*.

P. fulgens (brilliant).* *fl.* in several very loose racemes, 3in. to 6in. long, forming a deltoid panicle; sepals and petals bright red, the latter 2in. to 2½in. long, with a large, truncate scale at the base; peduncle 3ft. long below the inflorescence, copiously leafy. May. *l.*, produced ones twenty to a tuft, ensiform, 2ft. to 3ft. long, 1in. to 1½in. broad, white at back, prickle-margined. Brazil, 1850. A fine plant, well known in cultivation. SYN. *P. Decaisnei*.

P. fulgens (brilliant). A garden synonym of *P. Karwinskiana*.

P. Funkiana (Funk's). *fl.* in a sub-spicate raceme, 6in. to 12in. long; sepals 1in. long; petals nearly white, over 2in. long; bracts yellowish-green, 1in. to 1½in. long; peduncle 2ft. long, slightly pubescent, its lower leaves large. May. *l.* lanceolate, entire, 2ft. to 3ft. long, 2in. to 2½in. broad, glabrous; petiole unarmed, 6in. to 12in. long. Venezuela, 1850. (R. G. 113.) SYN. *P. macrocalyx* (B. M. 4705).

P. furfuracea (scurfy). *fl.* in three to five rather dense racemes, the end one about 1ft. long; petals bright red, 2in. to 2½in. long, scaled at base; peduncle, including the inflorescence, 2ft. to 3ft. long. July. *l.* linear, about 2ft. long and 1in. broad, acuminate, not distinctly petioled, white-furfuraceous at back, spiny towards the base. Native country unknown. Mr. Baker regards this as "doubtfully distinct, specifically, from *P. latifolia*." (B. M. 2657.)

P. heterophylla (variable-leaved). *fl.* six to twelve in a capitate, sessile or nearly sessile spike; sepals reddish, 1in. to 1¼in. long; petals bright red, rarely white, about 1¾in. long; pedicels very short or wanting. May. *l.*, outer rudimentary ones of the

Pitcairnia—*continued.*

rosette deltoid; produced ones about six, linear, 1ft. to 2ft. long, ¼in. to ½in. broad, not petioled, nor at all toothed. Mexico, &c., 1848. SYNS. *P. exscapa* (B. M. 4591), *P. Morrenii* (L. J. F. 21), *Puya heterophylla* (B. R. xxvi. 71), *Puya longifolia* (L. & P. F. G. 86).

P. imbricata (imbricated). *fl.* in a sub-spicate raceme, 1ft. long; sepals whitish, tipped with green, 1in. long; petals creamy-white, lingulate, more than 2in. long; peduncle 1ft. long, closely leafy. October. *l.* twelve to twenty to a stem, ensiform, 1½ft. to 2ft. long, with a petiole 6in. to 12in. long, armed with small, deflexed, horny, brown prickles. Mexico and Cordova, 1868. Plant caulescent.

P. integrifolia (entire-leaved). *fl.* in one to five very loose racemes, the end one 1ft. long; petals bright red, 1in. longer than the sepals, scaled at base; peduncle more than 1ft. long. August. *l.*, produced ones linear, 2ft. to 3ft. long, about ½in. broad, tapering to a long point, not distinctly petioled, closely white-furfuraceous at back, destitute of teeth. West Indies, about 1810. (B. M. 1462.)

P. intermedia (intermediate). A garden synonym of *P. alta.*

P. iridiflora (Iris-flowered). *fl.* in a raceme 1ft. long; petals bright red, 2in. long, not scaled at base; peduncle about 1ft. long. July. *l.* linear, 2ft. to 3ft. long, ¼in. broad, much overtopping the raceme, spine-toothed. Native country unknown.

P. Jacksoni (Jackson's). *fl.* in a loose raceme, 8in. to 9in. long; petals bright red, three times as long as the sepals, scaled at base; peduncle over 3ft. long, with many reduced leaves. May. *l.* linear, entire, 2ft. to 3ft. long, ½in. broad, white-furfuraceous at back; petioles channelled, 1ft. long, spine-edged at the dilated base. Guatemala, about 1850. (B. M. 4540.) SYN. *Lamprococcus Jacksoni* (L. J. F. 127).

P. Karwinskiana (Karwinski's).* *fl.* in a dense raceme, about 6in. long; sepals reddish, ⅜in. long; petals bright red, secund, 2½in. long, not scaled; peduncle 1ft. to 2ft. long, with many reduced leaves. June. *l.*, produced ones linear, 1½ft. to 2ft. long, ½in. to ⅝in. broad, distinctly petioled, usually without prickles. Mexico. A well-known species. SYN. *P. ringens* (R. G. 53). This species is also known in gardens as *P. fulgens*, *P. montalbensis*, and *P. Warcewicziana.*

P. latifolia (broad-leaved). *fl.* in a simple or slightly compound raceme, 6in. to 9in. long; petals bright red, 2in. long, scaled at base; peduncle 1ft. to 2ft. long, leafy. August. *l.* linear, 2ft. to 3ft. long, nearly 1in. broad, acuminate, not distinctly petioled, white-furfuraceous at back, with only a few prickles. St. Eustace Island, 1785. (A. B. R. 322; B. M. 856.)

P. Lehmanni (Lehmann's). *fl.* in dense, panicled racemes; petals bright red, 1½in. to 1⅝in. long. *l.*, produced ones ensiform, 2ft. to 3ft. long, above 1in. broad, copiously spiny towards the base. Southern New Grenada.

P. lepidota (scaly). A synonym of *P. Andreana.*

P. longifolia (long-leaved). A synonym of *P. pulverulenta.*

P. macrocalyx (large-calyxed). A synonym of *P. Funkiana.*

P. maidifolia (Indian Corn-leaved). *fl.* in a sub-spicate raceme, nearly 1ft. long; sepals 1in. long; petals greenish-white, 2½in. long; peduncle leafy, 1½ft. to 2ft. long. May. *l.* lanceolate, petioled. 2ft. to 3ft. long, 1½in. to 2in. broad, without prickles. Venezuela, 1848. (F. d. S. 915.) SYN. *Puya maidifolia.*

P. montalbensis (Monte Alban). A garden synonym of *P. Karwinskiana.*

P. Moritziana (Moritz's). *fl.* in a loose raceme, 6in. to 12in. long; sepals ⅜in. long; petals bright red or reddish-yellow, 2in. to 2½in. long, not scaled; peduncles 6in. to 15in. long, with many erect, reduced leaves. Summer. *l.*, produced ones many to a rosette, linear, 1ft. to 1½ft. long, 1in. broad, not distinctly stalked, mostly without prickles. Guatemala, about 1860.

P. Morrenii (Morren's). A synonym of *P. heterophylla.*

P. muscosa (mossy).* *fl.* in a loose raceme, 3in. to 6in. long; petals bright red, 2in. long, not scaled at base; peduncle 6in. to 9in. long, densely floccose. December. *l.* twelve to twenty in a tuft, linear, 6in. to 9in. long, falcate, very acuminate, white-furfuraceous at back, entire or minutely denticulate. *h.* not more than 1ft. Central Brazil. (B. M. 4770.)

P. nubigena (cloud-born). *fl.* in a somewhat dense raceme, 6in. to 8in. long; sepals red, 1in. to 1¼in. long; petals bright red, scaled at base, more than twice as long as the sepals; peduncle leafy, 1ft. to 1½ft. long. October. *l.*, produced ones ensiform, petioled, 1in. broad, narrowed to both ends, entire. Venezuela (at 8000ft. to 9000ft. altitude), 1852. Plant tufted. (F. d. S. 847.)

P. odorata (odorous). A synonym of *P. albiflos.*

P. platyphylla (broad-leaved). A variety of *P. bromeliæfolia.*

P. pulverulenta (powdery). *fl.* in many racemes, arranged in a deltoid panicle; petals bright red, about 2in. long, scaled at base; peduncle elongated, with several leaves. December. *l.*, produced ones ensiform, 3ft. to 4ft. long, 1½in. to 2in. broad, narrowed at both ends, spine-margined towards the base, white-furfuraceous beneath. *h.* 6ft. to 12ft. Andes of Peru, 1852. SYN. *P. longifolia* (B. M. 4775).

Pitcairnia—*continued.*

P. pungens (stinging).* *fl.* in a dense raceme, 4in. to 8in. long; sepals rather cottony; petals bright red, scarlet at base, 2in. long; peduncle 6in. to 12in. long, cottony, its many leaves bract-like, the lower sometimes pectinate. May. *l.*, produced ones six to eight, linear, 1ft. to 1½ft. long, scarcely ½in. broad, loosely furfuraceous on the back, destitute of prickles; outer rudimentary ones furnished with a long, rigid, pectinate tip. Andes, 1863. (B. M. 5356.)

P. punicea (reddish). *fl.* in a loose raceme, 4in. to 6in. long; sepals about ¼in. long; petals bright red, 1¼in. to 1⅜in. long; peduncle very short. Summer. *l.*, proper ones twenty to thirty, spread over 3in. to 4in. of the stem, linear, not distinctly petioled, about 1ft. long, less than ½in. broad, white-furfuraceous at back. *h.* about 1ft. Mexico. Plant caulescent.

P. recurvata (recurved). *fl.* in a dense, sub-spicate raceme, 4in. to 6in. long; sepals nearly 1in. long; petals milk-white, 3in. to 3½in. long, much decurved, minutely scaled at base; peduncle 1½ft. to 2ft. long, furfuraceous, with bract-like leaves. April. *l.*, produced ones ten to twelve to a stem, lanceolate, 2ft. long, 1in. to 1⅜in. broad, minutely serrulated towards the tip, white-furfuraceous beneath. Native place unknown, 1843.

P. ringens (gaping). A synonym of *P. Karwinskiana.*

P. Skinneri (Skinner's). A garden synonym of *P. alta.*

P. speciosissima (very showy). A garden synonym of *P. undulata.*

P. staminea (long-stamened). *fl.* in a long, loose raceme, 1ft. to 1½ft. long; petals bright red, 2in. long, very narrow, revolute at the apex, scaled at base; peduncle 1ft. to 2ft. long, its lower leaves long, its upper rudimentary. January. *l.*, produced ones ten to twenty to a tuft, linear, 1ft. to 2ft. long, ⅛in. to ¼in. broad, very acuminate, thinly white-furfuraceous on the back, with a channelled petiole, 6in. or more long, entirely without teeth. Rio Janeiro, about 1820. A well-known species. (B. M. 2411; I. H. n. s. 205; L. B. C. 722.)

P. suaveolens (sweet-scented). *fl.* in a moderately dense raceme, 6in. to 8in. long; sepals about 1in. long; petals whitish, lingulate, 2in. long; peduncle above 1ft. long, with many much-reduced leaves. July. *l.*, produced ones linear, 1½ft. long, ⅛in. to ⅜in. broad at the middle, acuminate, not petioled, entirely without prickles, glabrous. Organ Mountains, 1826. (B. R. 1069.)

P. sulphurea (sulphur-coloured). A variety of *P. bracteata.*

P. tabulæformis (plank-like).* *fl.* thirty to forty, in a dense head, sessile in the centre of the rosette of leaves; sepals bright red, less than 1in. long; petals the same colour, but 3in. long, scaled at base. *l.*, produced ones twenty to thirty, in a sessile rosette, oblong, spathulate, 5in. to 6in. long, 2in. broad, gradually narrowed to both ends, free from spines. Mexico, 1863. The leaves lie flat on the soil, hence the specific name. (B. H. 1862, p. 257; F. M. 297; I. H. 344.)

P. undulata (wavy). *fl.* in a simple raceme, 1ft. long, lax in the lower half, the rachis bright red; petals also bright red, more than twice as long as the sepals; peduncle 1ft. long, with five or six small, adpressed leaves. July. *l.*, produced ones obovate-oblong, 1ft. or more long, 4in. to 5in. broad, cuneate at base, finely white-furfuraceous at back, with a distinct unarmed petiole, 6in. to 8in. long. Brazil (?), 1843. A fine, well-known species, sometimes known in gardens as *P. speciosissima.* (F. d. S. 162; R. G. 781.)

P. undulatifolia (wavy-leaved). A synonym of *P. Altensteinii.*

P. virescens (greenish). *fl.* in a sub-spicate raceme, 6in. to 8in. long; sepals 1in. to 1¼in. long; petals pale yellowish-green, twice as long as the sepals; peduncle 2ft. long, the leaves graduating into bracts. March. *l.* lanceolate, not petioled, 1½ft. to 2ft. long, 1½in. to 2in. broad, free from prickles. Venezuela, 1857. SYN. *Puya virescens* (B. M. 4991).

P. Warcewicziana (Warcewicz's). A garden synonym of *P. Karwinskiana.*

P. Wendlandi (Wendland's). *fl.* in a sub-spicate raceme, 6in. to 12in. long; sepals 1in. long; petals sulphur-yellow, scaled at base, more than twice as long as the sepals; bracts purplish-red or greenish towards the tip; peduncle closely leafy, 2ft. or more long, stiffly erect. December. *l.*, produced ones entire, ensiform, 2ft. to 3ft. long, 2in. to 3in. broad, with a distinct, unarmed petiole. Native country unknown. About 1853. SYN. *Puya sulphurea* (B. M. 4696).

P. xanthocalyx (yellow-calyxed).* *fl.* in a simple raceme, loose in the lower half, 1ft. to 2ft. long; petals lingulate, primrose-yellow, 2in. long; peduncle 1½ft. to 2ft. long, the lower leaves 6in. to 12in. long. Summer. *l.*, produced ones up to twenty to a stem, lanceolate, 2ft. to 3ft. long, 1in. to 1¼in. broad, obscurely petioled, free from prickles, white-furfuraceous at back. Brazil, 1877. *P. flavescens* (B. M. 6318) is regarded, by Mr. Baker, as synonymous with this species.

P. zeifolia (Zea-leaved).* *fl.* in a sub-spicate raceme, 1ft. to 1½ft. long; sepals nearly 1in. long; petals nearly white, more than twice as long as the sepals; bracts reddish-yellow; peduncle 1ft. to 2ft. long, leafy, nearly glabrous. *l.* lanceolate, entire, 2ft. to 3ft. long, 2in. to 2½in. broad, naked, with a channelled petiole, 6in. long. Guatemala. (B. M. 6535.)

PITCHER. A name commonly applied to the tubular petioles of the Sarracenias, and also to the urn-like expansion in *Nepenthes*. Sir Joseph Hooker has shown that, in the latter genus, the Pitcher is not the dilated petiole, but a special organ, represented by a gland at the top of the costa of the young leaf.

PITCHER-PLANT. *See* **Nepenthes** and **Sarracenia.**

PITCH-TREE, BURGUNDY. *See* **Picea excelsa.**

PITH. The central cellular part of a stem; the same as Medulla.

PITHECOCTENIUM (from *pithex, pithecos*, a monkey, and *kteis, ktenos*, a comb; in allusion to the common name). Monkey's Comb. ORD. *Bignoniaceæ*. A genus comprising about a score species of stove, often tomentose-pubescent or lepidoted, sometimes glabrous, climbing shrubs, natives of tropical America, extending from Brazil to Mexico. Flowers white or violet, rather large, disposed in simple, or rarely sub-thyrsoid, branched racemes; calyx broadly tubular-campanulate, truncate or minutely five-toothed; corolla tube cylindrical and enlarged above the base, often incurved; limb sub-bilabiate; lobes five, round, spreading. Leaves opposite, trifoliolate, or with the terminal leaflet changing to a tendril, or deficiently bifoliolate; leaflets entire, petiolulate. Very few species are now grown. For culture, *see* **Bignonia.**

P. Carolinæ (Lady Caroline's). *fl.* snow-white, with the tube tinged with yellow, sweet scented; corolla arcuate, tomentose, with curled segments; panicle terminal, few-flowered. May. *l.* conjugate; leaflets cordate, acuminate, slightly pubescent. *h.* 10ft. Plant slender, glabrous. (B. R. 1844, 54, under name of *Bignonia Carolinæ*.)

PITHECOLOBIUM (from *pithecos*, an ape, and *lobos*, the lobe of the ear; in allusion to the native name, Monkey's Earring). Curl Brush Bean. ORD. *Leguminosæ*. This genus comprises about 100 species of unarmed or prickly-stipuled, stove trees or shrubs, extending over tropical regions, mostly in Asia and America, a few being natives of Africa and Australia. Flowers often white, similar to those of *Inga*; calyx campanulate or tubular; corolla tubular or funnel-shaped; peduncles solitary or sub-fasciculate, axillary or racemose, or fasciculate at the tips of the branches; heads globose, or rarely in oblong or almost cylindrical spikes. Pods compressed or flat, either spirally twisted or much curved, bivalved or rarely indehiscent. Leaves bipinnate; leaflets sometimes small and many-jugate, sometimes large and few-jugate, occasionally tergeminate, bigeminate, or geminate (pinnæ one-jugate, three, two, or one-foliolate); stipules sometimes small or inconspicuous, sometimes persistent, hard or spinescent. Few of the species have been introduced. For culture, *see* **Inga.**

P. pruinosum (frosty). *fl.* white, with long, exserted stamens, and growing in globular umbels from the axils of the upper leaves. *l.*, pinnæ very regularly in one or two pairs, with or without an odd one; petiole and each rachis varying from 1in. to 6in. long; leaflets usually three or four pairs on the terminal pinnæ, very irregular in number, size, and shape. Queensland and New South Wales, 1869. A beautiful tree, having the young branches, foliage, and inflorescence, covered with a rusty pubescence.

PITS. These are valuable and well-known garden structures, utilised in their simplest form for protecting plants from the injurious effects of rain and severe frost. When heated, they are eligible for plant culture generally, for Cucumber, Melon, and Pine-growing, and for propagating. Pits are distinguished from frames by their walls being built partly beneath the ground, which consequently renders them fixtures, whereas frames are

Pits—*continued.*

movable; generally, all the sashes are movable in both cases. Pits do not afford similar facilities for attending to the occupants as do houses, which the cultivator can enter in all weathers; yet they are indispensable where large, or even small, quantities of young plants

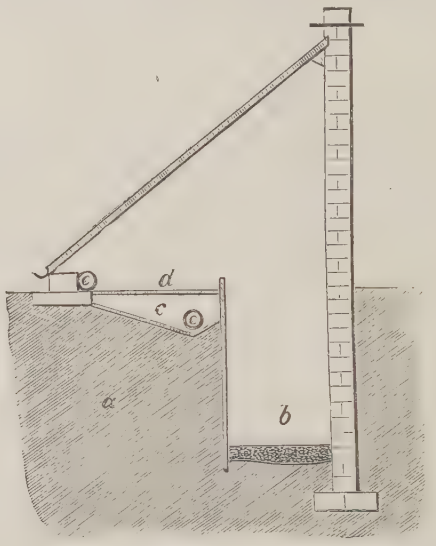


FIG. 191. SECTION OF LEAN-TO PIT.

a, Ordinary Soil; *b*, Passage; *c*, Heated Chamber below Stage; *d*, Bed; *e*, *e*, Hot-water Pipes.

have to be raised and grown on. For bedding plants, a single hot-water pipe is usually sufficient, in a low, narrow Pit, for expelling damp and keeping out frost, except in very severe or unfavourable weather, when cover-

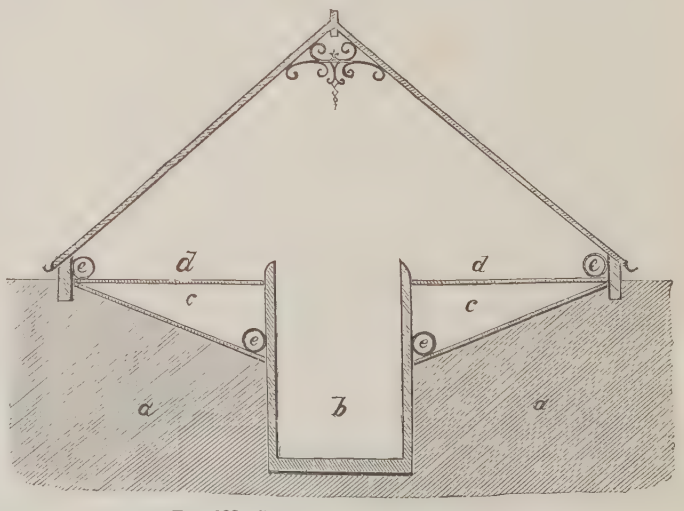


FIG. 192. SECTION OF SPAN-ROOFED PIT.

a, *a*, Ordinary Soil; *b*, Passage; *c*, *c*, Heated Chambers; *d*, *d*, Plunging Beds; *e*, *e*, *e*, *e*, Hot-water Pipes.

ings would be necessary. For Cucumber, Melon, or Pine Pits, a more substantial and much higher structure, and also a greater heating power, are necessary. Fig. 191 represents a useful little Pit for early forcing of Melons or Cucumbers. A narrow, sunken passage, entered from one end, affords sufficient space for attending to the plants; and if a shelter were fixed to the back wall for

Pits—*continued.*

early forced Strawberries, these might possibly be watered from the outside, by opening the sashes a little. Special propagating Pits are best built rather low, in order that they may not be too much exposed to cold winds, and that cuttings, when inserted, may be near the light. To this end, the floor for these is also often sunk into the ground; a path passes through the centre, with a door at the end, and a heated plunging-bed is provided on one or both of the sides (see Fig. 192). If the top sashes are fixed, instead of being movable, then a structure of this sort is more correctly termed a house. Although wood is sometimes used, nothing surpasses ordinary bricks for constructing a framework on which to rest the rafters and sashes. Bricks keep out frost better than wood, and are also much more substantial. Pits are sometimes built with hollowed walls—that is, a double set of bricks is arranged so as to leave a hollow space between; the idea being that of retaining heat, which passes more readily through a solid wall than where there is a chamber midway containing air.

PITTED. Having numerous small, shallow depressions or excavations.

PITTOSPOREÆ. A small order of glabrous, or rarely tomentose or pilose, arborescent or erect shrubs, or twining or flexuous-procumbent under-shrubs, dispersed over the warmer regions of the globe, but mostly found in Australia. Flowers white, blue, yellow, or rarely reddish, hermaphrodite, regular or slightly oblique, sometimes borne on terminal, solitary and nodding, or corymbose or paniculate peduncles, occasionally axillary and solitary or fasciculate; sepals five, distinct, imbricated, or rarely connate at base; petals five, hypogynous, imbricated, longer than the sepals; claw connivent or sometimes coherent; stamens five, hypogynous, free, alternating with the petals, the filaments filiform, or dilated in the middle or at the base. Fruit a capsule or berry. Leaves alternate, entire, toothed, or very rarely slightly cut; stipules none. The species contain resinous, aromatic, and bitter principles, which impart a disagreeable flavour to the fruit. Nine genera and about ninety species are included in the order. Examples are: *Billardiera*, *Marianthus*, *Pittosporum*, and *Sollya*.

PITTOSPORUM (from *pitta*, pitch, tar, and *sporos*, seed; in allusion to the resinous coating of the seeds). ORD. *Pittosporeæ*. A rather large genus (fifty species have been described) of greenhouse or half-hardy, glabrous or tomentose, erect shrubs or small trees, occurring in Africa, the warmer parts of Asia, the Pacific Islands, Australia, or New Zealand. Flowers sometimes in terminal clusters, corymbose, sub-umbellate or paniculate, sometimes solitary or few, terminal, axillary, or lateral; sepals distinct or connate at base; petals connivent or cohering at base, or rarely spreading. Leaves entire, sinuate-dentate, in some species often sub-verticillate at the apices of the branches. All the species form very handsome subjects, and are well adapted for growing in conservatories. The half-hardy ones thrive in any common garden soil, but, except in the south-western counties, &c., require the shelter of a wall. The greenhouse ones succeed in a well-drained, fibry loam. *P. Tobira* is a favourite plant in the Paris flower-markets, and is largely grown for its very fragrant blossoms. All are readily propagated by means of cuttings of the half-ripened wood, inserted in sandy soil, under a bell glass, in a greenhouse, and kept shaded until roots are formed.

P. coriaceum (leathery-leaved). *fl.* bluish-white; peduncles umbellately branched, many-flowered, and, as well as the calyces, villous. May. *l.* obovate, obtuse, coriaceous, quite smooth. *h.* 8ft. Madeira, 1783. Greenhouse shrub. (A. B. R. 151; L. B. C. 569.)

Pittosporum—*continued.*

P. cornifolium (Cornus-leaved). *fl.* dingy-red, polygamous, on very slender, terminal, one or two-flowered peduncles; sepals very narrow, subulate; petals as narrow, with slender tips. May. *l.* whorled, obovate or elliptic-lanceolate, shortly petioled, quite entire and glabrous, coriaceous. Branches forked or whorled. *h.* 2ft. to 4ft. New Zealand, before 1832. A small, slender, half-hardy shrub. (B. M. 3161.)

P. crassifolium (thick-leaved).* Parchment-bark. *fl.* dark chocolate-purple, freely produced in nodding, pedunculate umbels. April. *l.* alternate, narrow-obovate, linear-obovate, or oblong, obtuse, quite entire, light green, tomentose on the under surface. *h.* 4ft. to 10ft. New Zealand, 1872. A bushy-growing, half-hardy shrub, of erect branching habit. (B. M. 5978.)

P. elegans (elegant). A synonym of *P. eugenioides*.

P. eugenioides (Eugenia-like). *fl.* greenish-white, more or less diœcious, fragrant; sepals very variable, ovate, acuminate, glabrous; petals narrow and spreading, recurved. *l.* usually elliptical, acute, narrowed into long petioles, rarely broader and obovate, quite entire, undulated or crisped, rather coriaceous, with numerous fine veins. *h.* 20ft. to 30ft. New Zealand. Greenhouse tree. SYNS. *P. elegans*, *P. microcarpum*.

FIG. 193. PITTOSPORUM TOBIRA, showing Habit and detached Flowering Twig and Flower.

P. ferrugineum (rusty). *fl.* yellow, small; peduncles terminal, usually clustered several together above the last leaves. April to July. *l.* from obovate or ovate, and obtuse or scarcely acuminate, to oblong or almost lanceolate, acuminate, and 3in. to 4in. long, quite entire, narrowed into a petiole, rusty-tomentose on both sides when very young. *h.* 6ft., sometimes attaining 50ft. to 60ft. Australia, 1787. Greenhouse tree. (B. M. 2075.)

P. microcarpum (small-fruited). A synonym of *P. eugenioides*.

P. revolutum (revolute). *fl.* yellow; peduncles terminal, few or solitary, usually decurved, bearing sometimes a single, rather large flower, but more frequently a dense, ovoid or corymbose raceme. February to April. *l.* ovate-elliptical, or elliptical-oblong, shortly acuminate, 2in. to 4in. long, scarcely undulate, narrowed into a petiole. *h.* 4ft. to 6ft. Australia, 1795. Greenhouse shrub. (B. R. 186; S. F. A. 25, under name of *P. fulvum*.

P. sinense (Chinese). A synonym of *P. viridiflorum*.

FIG. 194. FLOWERING BRANCHLET OF PITTOSPORUM VIRIDIFLORUM.

Pittosporum—*continued.*

P. Tobira (its native name).* *fl.* white, fragrant; peduncles one-flowered, pubescent, disposed in aggregate umbels. March to August. *l.* obovate, obtuse, coriaceous, smooth. *h.* 12ft. Japan, 1804. Half-hardy shrub. See Fig. 193. (B. M. 1396.)

P. undulatum (wavy-leaved).* *fl.* white; peduncles terminal, aggregate, pubescent, branched, many-flowered. February to June. *l.* oval-lanceolate, undulated, tapering at both ends, glabrous. *h.* 10ft. Australia, 1789. Half-hardy shrub. (A. B. R. 383; B. R. 16.)

P. viridiflorum (green-flowered).* *fl.* greenish-yellow, Jasmine-scented; panicle somewhat globose, terminal, glabrous. May. *l.* obovate, retuse, cuneate at the base, shining, under surface reticulated. *h.* 6ft. Cape of Good Hope, 1806. Greenhouse shrub. See Fig. 194. (B. M. 1684.) SYN. *P. sinense.*

PLACEA (said to be derived from the native name in Chili). ORD. *Amaryllideæ.* A genus comprising (according to Mr. Baker) about five species of greenhouse, bulbous plants, natives of Chili, and closely related to *Hippeastrum*, from which they differ in having a perfect evolute corona. Flowers many in an umbel, pedicellate; perianth somewhat funnel-shaped, slightly declinate, with an exceedingly short tube. Leaves linear, carinate. Herr Max Leichtlin, a wonderfully successful cultivator of choice bulbous and other plants, says: "Placea is one of those bulbs which will not be pot-bound. I either plant them in a walled frame, which is kept free of frost, or in a low house which has a border on the south side, and is kept between 37deg. and 40deg. Fahr. at night, and leave them well alone. They go to rest about August, and push about December, flowering in May. In a pot, they ought to have their exact time of rest, and must be buried in the soil, which ought to be very rich; but in pots they are not certain to flower. They must be planted with at least an inch of soil over their necks, and they prefer a loose soil. I use thoroughly-decomposed cow-manure (three and four years old), mixed, during decomposition, with one-third silver sand." The three best-known species are here described.

FIG. 195. FLOWERS OF PLACEA ARZÆ.

P. Arzæ (Arza's). *fl.* pale yellow, lined with purple; corona monophyllous, base yellow, apex purple; umbel three to five-flowered; scape 1½ft. high. *l.* two, glaucous, 9in. long, ½in. broad. Bulb 2½in. in diameter. See Fig. 195.

P. grandiflora (large-flowered). *fl.* white, freely striped with bright crimson, large; scape erect, terminating in an umbel of several handsome flowers. *l.* few, linear, long, rounded and fistulose at the margin. 1869. This, the finest species of the genus, resembles *P. ornata*, but is much larger. (I. H. 574.)

P. ornata (adorned). *fl.* snow-white, lined with brilliant vermilion within; segments spathulate-oblong; corona white, scarlet at apex; scape 8in. to 9in. high, four to seven-flowered. May. *l.* linear, shining, obtusely keeled below. 1840. (B. R. xxvii. 50.)

PLACENTA. The part on which the ovules originate.

PLACENTIFORM. Quoit-shaped, or like a flat cake in form.

PLACODIUM. A synonym of **Plocama** (which *see*).

PLACOMA. A synonym of **Plocama** (which *see*).

PLADERA. A synonym of **Canscora** (which *see*).

PLAGIANTHUS (from *plagios*, oblique, and *anthos*, a flower; referring to the usually unequal-sided petals). Cotton-tree; Ribbon-tree. ORD. *Malvaceæ.* A genus comprising about eleven species of greenhouse or half-hardy shrubs, or rarely herbs, natives of Australia and New Zealand. Flowers white, often small, in the axils or in terminal crowded spikes, rarely solitary or disposed in short axillary panicles; calyx five-toothed or five-fid. Leaves entire, sinuate, angled, or rarely lobed. The species described below are half-hardy shrubs, except where otherwise stated. For culture, *see* **Malva-viscus.**

P. betulinus (Birch-like). *fl.* small, on slender, ebracteolate pedicels; panicles terminal, much-branched, very many-flowered, stellate-tomentose. Summer. *l.* of young plants ¼in. to ½in. long, rounded-ovate, variously crenate and lobed; in full-grown specimens, 1in. to 2in. long, ovate or ovate-lanceolate, acuminate, rounded or cuneate at base, coarsely crenate-serrate or obtusely doubly serrate. *h.* (in its native place) 40ft. to 70ft. New Zealand, 1870.

P. divaricatus (straggling). *fl.* in axillary fascicles or on one-flowered peduncles, shorter than the leaves. June. *l.* ⅛in. to ¾in. long, narrow-linear or sub-cuneate, obtuse, quite entire, one-nerved. Branches slender, spreading, tough. *h.* 8ft. New Zealand, 1820. As this species is only found in salt marshes, where very few shrubby plants thrive, its cultivation in such places might prove beneficial. (B. M. 3271.)

P. Lampenii (Rev. R. Lampen's).* *fl.* very pale yellow, almost white; petals five, roundish-oblong, much longer than the calyx; panicles short, leafy, axillary. November to February. *l.* shortly petiolate, oblong-lanceolate, acute, 4in. to 5in. long, sharply and regularly serrated, deep green above, hoary beneath. *h.* 6ft. to 8ft. Van Diemen's Land, 1833. (G. C. n. s., xxii. 201.)

P. Lyallii (Lyall's).* *fl.* ¾in. broad, drooping, axillary; peduncles one-flowered, solitary or fascicled, ebracteolate, about as long as the petioles. July. *l.* 2in. to 4in. long, ovate-cordate, acuminate, deeply and doubly crenated; petioles ½in. to 1½in. long. *h.* 20ft. New Zealand, 1871. A handsome, greenhouse, sub-deciduous shrub. (B. M. 5935.)

P. pulchellus (pretty). *fl.* small, clustered along the rachis of axillary racemes; males pedicellate, females sessile. Summer. *l.* on rather long petioles, from deeply cordate-ovate to lanceolate, often acuminate, 2in. to 3in. (or rarely more) long, coarsely crenate. Australia. Tall greenhouse shrub or small tree. (B. M. 2753, under name of *Sida pulchella.*)

P. sidoides (Sida-like). *fl.* small, in short, axillary racemes, the males with a campanulate, the females with a tubular, calyx. Summer. *l.* from ovate-lanceolate to lanceolate, obtusely serrate, 2in. to 3in., or rarely 4in., long, rounded at base, on petioles ¼in. to ½in. long, glabrous on the upper side when full grown, with numerous impressed veins. *h.* 4ft. Australia. Greenhouse. (B. M. 3396.)

PLAGIOGYRIA. Included under *Lomaria.*

PLAGIOLIRION (from *plagios*, oblique, and *leirion*, a lily; in allusion to the shape of the perianth). ORD. *Amaryllideæ.* A monotypic genus, requiring treatment similar to **Eucharis** (which *see*).

P. Horsmanni (Horsmann's).* *fl.* white, not scented, small, disposed in a scapose, ten to twelve-flowered umbel; perianth irregular, one segment being directed downwards, and the other five ascending. June and July. *l.* two or three to a stem, stalked, elliptic, acute, bright green above, light green beneath. Bulb long-necked. Columbia, 1883. (G. C. n. s., xx. 105, Fig. 16.)

PLAGIOLOBIUM. Included under *Hovea.*

PLAGIOPHYLLUM. A synonym of **Centradenia** (which *see*).

PLAITED. Folded lengthwise, like the plaits of a closed fan.

PLANE. Flat; level.

PLANERA (named in honour of I. J. Planer, a German botanist, who published a Flora of Erfurt, in 1788). ORD. *Urticaceæ*. A monotypic genus. The species is a hardy, deciduous, unarmed tree, probably not now in cultivation in Britain. It requires culture similar to **Ulmus** (which *see*).

P. aquatica (aquatic). Planer-tree. *fl.* brown, clustered; perianth four or five-fid. March and April. *fr.* nut-like, oblique, ovate, compressed, wingless. *l.* 1in. to 1½in. long, alternate, distichous, shortly stalked, serrated, ovate, acute, roughish, penniveined; stipules free, caducous. *h.* 20ft. to 30ft. Southern United States, 1816. SYN. *P. Gmelini*.

P. Gmelini (Gmelin's). A synonym of *P. aquatica*.

PLANER-TREE. *See* **Planera aquatica.**

PLANE-TREE. *See* **Platanus.**

PLANE-TREE, SCOTCH. A general name in Scotland for *Acer Pseudo-platanus*.

PLANTAGINEÆ. A natural order of herbs, sometimes annual or perennial, almost stemless or stolon-bearing, sometimes shortly caulescent, branched or suffruticose, glabrous, simply pilose, or woolly in the axils; they are natives of the temperate regions of both hemispheres, especially in Europe and North America, and are but rarely met with in the tropics. Flowers regular, hermaphrodite or monœcious, small, in elongated or shortened spikes, or rarely solitary and sessile in the axils of the often scarious bracts; calyx four-parted, with closely-imbricated segments, persistent in the fruit; corolla hypogynous, gamopetalous, scarious, marcescent, with an ovoid or cylindrical tube, and four spreading, imbricated lobes, sometimes wanting in the female flowers; stamens four, or fewer. Fruit a one or more celled, one or more seeded, membranous capsule, stipitate or included. Leaves radical, or in the caulescent species alternate, rarely opposite, one to many-nerved, entire, toothed, or pinnatifid, sometimes sheathed; petioles usually dilated at the base, and accompanied by a woolly membrane. Several species of *Plantago* are employed in medicine. The order comprises only three genera—*Bougueria*, *Littorella*, and *Plantago*—and perhaps about 200 species.

PLANTAGO (the old Latin name of the genus, used by Pliny). Plantain. ORD. *Plantagineæ*. This genus comprises all the species of the order (which *see* for characters) save two. They are of very little importance from a garden standpoint. *P. Coronopus*, *P. lanceolata*, *P. major*, *P. maritima*, and *P. media*, are British plants. *P. brasiliensis* is sometimes seen in botanic gardens. All thrive in ordinary soil, and may be readily raised from seed; the perennial species may also be propagated by division.

P. brasiliensis (Brazilian). *fl.* whitish, disposed in a compact, cylindrical spike, about 3in. long: scape axillary, solitary, rounded, twice as long as the leaves, clothed with white, adpressed hairs. Summer. *l.* linear-lanceolate, smooth, three-nerved, entire, with the margins somewhat thickened, much narrowed towards the base, and dilated again at the stem, which they embrace. *h.* 1ft. Brazil, 1823. (B. M. 2616.)

PLANTAIN. *See* **Plantago.** The name is also applied to other plants.

PLANTAIN LILY. A common name for *Funkia*.

PLANTAIN-TREE. *See* **Musa.**

PLANTAIN-TREE, MAURITIUS. *See* **Musa rosacea.**

PLANT-BOXES AND CASES. Plant-boxes are used for large trees or shrubs that cannot be provided with pots of sufficient size to contain the roots. They are usually made of wood, but sometimes of slate, and the sides may be constructed so as to be movable, for allowing the roots and drainage to be examined, should it become necessary. Boxes made of slate have the advantage of great durability, and they are readily kept clean. Special provision should be made to insure drainage, and Boxes containing trees of large dimensions should, for this reason, be stood on something to keep them a little above the ground level. Plant or Cutting-boxes, about 3in. deep, for raising seedlings and growing-on tender bedding plants, are extremely useful; they answer well if the wood is merely planed over before being made up.

Plant-boxes and Cases—*continued.*

Boxes for window plants should be about 6in. deep: a less depth does not afford room for sufficient soil to sustain the plants for a season.

Plant-cases used outside windows, and also in rooms, require their occupants renewed occasionally, but not very frequently, if flowering plants are excluded. Many of the hardier species of Palms, greenhouse Ferns, Selaginellas, &c., are admirably adapted for the decoration of Plant-cases; tender or delicate subjects should not be included, unless the Cases are utilised for special purposes inside a glass structure.

An inclosed portion of a propagating-house, wherein cuttings of larger than ordinary size are inserted, is also termed a Plant or Propagating-case.

PLANTIA. Included under *Hexaglottis*.

PLANTING. *See* **Transplanting.**

PLANT LICE. *See* **Aphides.**

PLANT MITES. *See* **Mites.**

PLANT-PROTECTORS. These are very numerous, as the term is applicable to anything which acts, if only temporarily, to preserve plants from injury. Bell glasses, handlights, small movable frames, and even panes of glass, amongst many other things, may be termed appliances for plant-protection, when they are used as such to ward off heavy rains or severe frost. Full information will be found under **Bass or Bast Mats, Bell Glasses or Cloches, Cocoa-nut Fibre Refuse, Frames, Glass, Hand Glasses, Netting, Straw, Willesden Paper,** &c.

PLASMODIOPHORA BRASSICÆ. This is the cause of the disease known as "Clubroot," sometimes called also "Finger-and-Toe," in Turnips, Cabbages, Charlock, and other species of the genus *Brassica*, and also in *Raphanus Raphanistrum*, or Wild Mustard. It is a Fungus of very simple structure, and belongs to the curious group called *Myxomycetes*, the species in which, while vegetating, consist of minute, naked masses of protoplasm, endowed with a power of movement, by changing their forms, like the low microscopic animals called *Amœbæ*. These small, naked masses tend to unite when they meet, and thus they increase in size, and form what are called plasmodia. In some of the species, the plasmodia may reach a size of 2in. or more in breadth, and resemble a mass of clear or muddy-looking jelly. After a time, the plasmodia become covered with a firm coat, and break up into myriads of small, round cells, or spores, each inclosed in a cell-wall. These spores may remain for a time unchanged; but, under favourable circumstances, they burst, throw off the cell-wall, and appear as very minute plasmodia, which go through the same development as before. Almost all the *Myxomycetes* live on decaying organic matter, but *P. Brassicæ* does not. Its plasmodia are always minute, and they penetrate into the tissues of its hosts. The roots of a plant attacked by "Finger-and-Toe" vary considerably in appearance, according to the stage of the attack. The branch-roots very often bear swellings much exceeding the proper thickness of these roots. The swellings are usually spindle-shaped or roundish; at first, they are nearly smooth, but after some time they become rough. The main root is also often injured, as shown by its enlarged size, and, frequently, by its roughly-fingered appearance. In the autumn, and as winter advances, the diseased portion becomes more and more pulpy and decayed, and is also overgrown with other Fungi, which find their food in the rotting mass. Towards the end of winter, only the woody bundles of the roots remain moderately firm, the cellular tissues having dried up, and resembling coarse dust.

Plasmodiophora Brassicæ—*continued.*

Microscopic inspection of a thin slice from a diseased portion of a root, shows numerous cells of the tissue of the host-plant hardly altered in any way; but, intermixed with these, there are many others, from four to six times their diameter, which are occupied by the parasite; and it is these enlarged cells that alter the colour of the root, and make its surface in a transverse section, when a little magnified, look mottled. In the newly-diseased roots, these enlarged cells inclose a slimy, yellowish, granular plasm, in which are usually numerous cavities, filled with cell sap or with air. If examined at a later period, these enlarged cells are found filled with myriads of the minute, globular, thin-walled, transparent spores of *P. Brassicæ*. These remain uninjured during the keenest frosts of winter, and form a large part of the powdery material that fills up the decayed root between the woody bundles, and they become widely scattered through the soil by the action of wind and rain. When the weather becomes warmer, in the following spring, they begin to germinate, the cell-wall splits, and the protoplasmic contents pass out, and creep about through the damp soil like *Amœbæ*, and also by the help of a slender hair or cilium at one part. When they come into contact with others like themselves, they unite completely, and form larger plasmodia. If they meet with young roots of Cabbages, Turnips, Charlock, or Wild Mustard, they make their way into them, and produce the disease in them also.

This disease has, of late years, been spreading far and wide, and has proved very destructive in Turnip fields; so much so, that, in some districts, Turnips are no longer a profitable crop. It also attacks Turnips and Cabbages in vegetable gardens, though the less extended diffusion of the host-plants renders the attacks less fatal, and remedies more readily applicable. Frequent experiments have shown that, in soil in which diseased roots have been allowed to rot, a new crop of Cabbages, or other host-plants, will certainly suffer from disease if sown in that soil in the ensuing year. Even after a year has elapsed, the crop is liable to suffer from this cause, though to a less extent. Yet farmers almost always, and gardeners frequently, leave the diseased roots in the soil, as not repaying the labour of pulling them up. Experiments have been conducted by Mr. T. Jamieson, to ascertain the result of different manures on this disease, and have led him to the conclusion that the use of superphosphates, or soluble phosphates, is followed by a great increase of disease; and that ground coprolites, and ground or steamed bone-flour, are the manures that best enable the plants to resist it; but these conclusions are opposed by other experimenters. If the effects on Charlock, Wild Mustard, and Cabbages, are compared with those on cultivated Turnips, it is at once seen that the last plant suffers far more severely. The cause seems to be that the Fungus attacks the cellular tissue only, and this in Turnips is very largely developed, as it is this that renders the roots useful for food, and, accordingly, it has been promoted by the selection of those varieties for propagation that produce the largest roots with least woody fibre in them. The former plants are crippled, but are generally able to produce some seeds; but the Turnips are, in general, destroyed before they reach the stage to form seeds.

Remedies. All diseased roots ought to be collected at as early a stage as possible, and destroyed by burning, if this is practicable. Ground where Turnips have become diseased should not have Turnips or Cabbages grown in it for at least two years, to permit any spores in the soil to germinate, and thus to starve and kill the plasmodia. With the same object, all Charlock and Wild Mustard should be carefully eradicated, both from the ground and from its neighbourhood. Further experiments upon the effect of different manures are desirable, but, in the meantime, they point to ground coprolites, and to

Plasmodiophora Brassicæ—*continued.*

ground or steamed bone-flour, as the best artificial manure for Turnips. Unfortunately, no means are known for the cure of plants already attacked, prevention alone being practicable in any way.

PLATANACEÆ. A very small natural order of usually tall trees, with flaking bark; they inhabit the temperate or sub-tropical regions of the Northern hemisphere, two are natives of East Europe or Asia, and the rest are American. Flowers monœcious, in unisexual, globose, densely-crowded heads; "the stamens in the males, and the ovaries in the females, are mixed, without definite order, with scales, which may be bracts, perianth segments, or staminodes, or arrested ovaries" (J. D. Hooker). Fruit a nut. Leaves alternate, petiolate, broad, palmately nerved and lobed; petioles dilated at base; stipules membranous, caducous. The only genus of the order—*Platanus*—comprises only five or six species, which are mainly valuable for their timber and ornamental appearance.

PLATANTHERA. Included under **Habenaria** (which *see*).

PLATANUS (*Platanos*, the old Greek name, from *platys*, broad; referring to the foliage). Plane-tree. The only genus of Ord. *Platanaceæ* (which *see* for characters, &c.). The two species described below are magnificent trees for parks and similar situations. Both require a deep, rich, soft soil, and generally attain the greatest size where their roots have access to water. They require shelter, but must not be confined. Propagated by seeds, or by layers. The former are contained in round balls, which require to be broken, and should be sown in March; merely pressing them into the surface of the soil is sufficient, but they must be kept moist and shaded. The quickest way to propagate is from layers.

P. occidentalis (Western).* Button-wood; Western Plane. *fl.* greenish. May. *fr.* brownish; ripe in October and November. *l.* five-angled, obsoletely lobed, dentate, wedge-shaped at the base, downy beneath. *h.* 70ft. to 80ft. Atlantic and Western States, 1636. A fine species, differing from *P. orientalis* in its less deeply-lobed, more coriaceous, pubescent leaves, and in the fertile catkins being solitary on the long peduncles. It is rare in British gardens, and apparently not so hardy as the common species. (E. T. S. M. ed. 2, 261.)

P. orientalis (Eastern).* Oriental or Common Plane. *fl.* greenish-yellow. April. *fr.* brown; ripe in October, and persistent for the greater part of the winter. *l.* five-lobed, palmate, wedge-shaped at the base, the divisions lanceolate, sinuated; stipules nearly entire. *h.* 60ft. to 80ft. Levant, previous to 1548. (W. D. B. 101.) A beautiful tree, presenting a great variety of handsome forms, which differ chiefly in the shape and lobing of the leaves. The variety *acerifolia* (Maple-leaved) is the commonest in cultivation, frequently bearing the name of *P. occidentalis*, from which it may be readily distinguished when in fruit by the peduncles bearing more than one ball, and frequently many. It is the form known as the London Plane, on account of its being generally planted in the parks; and is an erect-growing tree, with usually three-lobed leaves, or, if five-lobed, less deeply so than in the typical form. (W. D. B. 100, under name of *P. occidentalis*.) The typical *orientalis* is a more spreading tree, with very large, deeply five-lobed leaves, cordate or truncate at the base. The variety *cuneata* has the leaves distinctly wedge-shaped at the base; *laciniata*, very deeply, much-divided leaves; and *variegata*, variegated foliage.

A plant in gardens, with fine bold foliage, called *P. californica*, has not yet fruited in this country; it is doubtful whether it really is the Californian *P. racemosa* (with which the true *P. californica* is synonymous).

PLATYCAPNOS. Included under **Fumaria** (which *see*).

PLATYCARPHA (from *platys*, broad, and *carphe*, chaff; in allusion to the broad, chaffy scales of the involucre). Ord. *Compositæ*. A genus consisting of a couple of species of stemless perennials from South Africa. Flower-heads purple, densely crowded, many-flowered, homogamous, sessile. Leaves numerous, stalked, spreading like a star upon the ground, pinnately divided, with coarsely-toothed lobes and pungent teeth. *P. glomerata* is a pretty and interesting plant; it thrives in a well-drained, sandy soil.

PLATYCARPUM (from *platys*, broad, and *karpos*, a fruit; alluding to the shape of the capsule). ORD. *Rubiaceæ*. A monotypic genus. The species is a tall, stove tree, with robust, opposite, terete branches. A compost of loam and leaf mould will suit it. Propagation may be effected by half-ripened cuttings, inserted in sand, under a glass. Keeping the plants rather dry during the winter, has a tendency to bring them into flower.

P. orenocense (Orinoco). *fl.* pale rose-colour, mediocre, disposed in terminal, trichotomously-branched panicles, pedicellate, ebracteate, and ebracteolate; calyx five-lobed, rather large, deciduous; corolla hypocraterimorphous, silky, with a short tube, and a limb of five equal, broadly oblong, imbricated lobes. Capsule somewhat woody, 1in. in diameter. *l.* oblong, 5in. to 6in. long, 2in. to 2½in. broad, opposite, petiolate, coriaceous, tomentose; petioles about ¼in. long. *h.* 20ft. Orinoco, 1813.

PLATYCARYA (from *platys*, broad, and *karyon*, a nut; alluding to the shape of the fruit). SYN. *Fortunea*. ORD. *Juglandeæ*. A monotypic genus. The species is an elegant, branching shrub or small tree, hardy only in favoured situations in the South of England. It thrives, however, in a cool conservatory, and, when planted out, will do well in almost any soil, requiring culture similar to **Juglans** (which *see*).

P. strobilacea (cone-fruited). *fl.* yellow; spikes all cylindrical, many-flowered, erect, many-bracted. August. *l.* five to eight-jugate, aromatic; leaflets ovate-lanceolate, acuminate, sessile, opposite, with serrulated margins. Japan and North China, 1844. (S. Z. F. J. 149.) SYN. *Fortunæa chinensis*.

PLATYCERIUM (from *platys*, broad, and *keras*, a horn; the fronds are divided into broad segments like stags' horns). Elk's-horn or Stag's-horn Fern. ORD. *Filices*. A small genus (about half-a-dozen species) of mostly stove ferns, widely diffused; they are readily distinguishable by their dichotomously-forked fertile fronds, with stag's-horn-like divisions. Sori forming large patches on the upper part of the lower surface of the fertile fronds. The Platyceriums may be considered at once amongst the grandest, most beautiful, and most extraordinary, of the whole order. They are distinct, epiphytal ferns, and thrive well in baskets or shallow pans. They also succeed when fastened to a large block of wood, with a little peat and sphagnum round their roots, and suspended in the stove. Rough peat and sphagnum form a suitable compost in which to pot them. The species described below require stove treatment, except where otherwise stated. *See also* **Ferns.**

Platycerium—*continued.*

FIG. 197. PLATYCERIUM ALCICORNE.

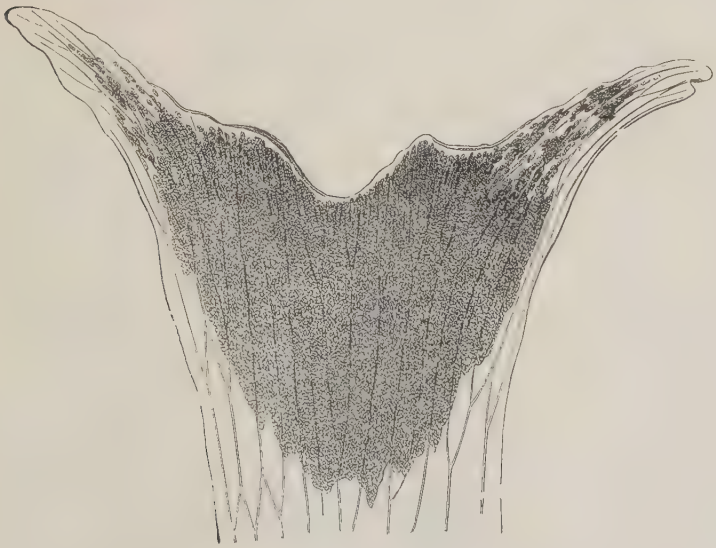


FIG. 196. UPPER PORTION OF FERTILE FROND OF PLATYCERIUM ÆTHIOPICUM.

P. æthiopicum (African). *barren fronds* rounded, convex, downy when young, the edge more or less lobed, the lobes spreading. *fertile fronds* 2ft. to 3ft. long, clustered, pendent, twice trichotomous, the disk and first division broader than in *P. alcicorne*, the patch of fruit surrounding the sinus, and passing into the fork so as to be shaped like the letter V; under surface covered with thin, white, cottony down. Guinea Coast and Angola, 1822. See Fig. 196. (H. G. F. 9.) SYN. *P. Stemmaria*.

P. æ. angolense (Angolan). A form having a broad-cuneate fertile frond, 9in. broad at the top, without either forks or horns, and with a patch of fruit nearly as broad as the lamina.

P. alcicorne (elk's-horn).* *barren fronds* rounded, convex, downy when young, the edge sinuated, the lobes spreading. *fertile fronds* 2ft. to 3ft. long, clustered, erect, two or three times dichotomous; ultimate divisions ligulate, bluntish, the fruit in the last forks, and at their base, in very irregular patches; under surface covered with thin, cottony down. Temperate Australia, &c., 1808. Greenhouse. See Fig. 197. The large form, *majus*, comes from Polynesia.

P. biforme (two-formed). *barren fronds* very thick, especially towards the base, imbricated, the edge sinuate-lobed. *fertile fronds* 6ft. to 15ft. long, repeatedly dichotomous from a sub-cuneate disk; barren divisions narrow-ligulate; fertile ones reniform, stalked, 6in. to 8in. broad, the outer edge rounded, entire. East Indies, 1842.

P. grande (grand).* *barren fronds* very large, sub-orbicular, convex, or the upper ones erect, deeply laciniated with spreading or inflexed divisions. *fertile fronds* 4ft. to 6ft. long, pendent, in pairs, the disk broad-cuneate, with the sorus against the upper edge, occupying the

Platycerium—*continued.*

FIG. 198. PLATYCERIUM GRANDE.

disk only, with an elongated, dichotomously-forked division beyond it at each corner. North Australia, 1828. See Fig. 198.

P. Hillii (Hill's).* *fronds* about 1½ft. long, flabellately branched in the upper third, the part just below the branching about 8in. broad, gradually tapering downwards into short stipes; mature fronds very thinly covered with white stellate hairs. *sori* forming small, roundish or oblong spots at the base of the ultimate lobes, or about an equal distance from the apex if there is no side lobe. Queensland, 1878. Allied to *P. alcicorne*. (G. C. n. s., x. 74, 75.)

P. Stemmaria (Stemmaria). A synonym of *P. æthiopicum*.

P. Wallichii (Wallich's).* *barren fronds* deeply lobed. with inflexed, forked divisions. *fertile fronds* in pairs, pendent, each in two divisions, in each of which the cuneate disk has a rounded upper edge, occupied by a sorus; from either side of the sorus a one-forked division is produced; under surface matted with yellowish woolly pubescence. Malay Peninsula, 1860.

P. Willinckii (Willinck's).* *barren fronds* erect, sub-orbicular, lobed. *fertile fronds* in threes, elongated, drooping, narrowly cuneate, dichotomously cut up into narrow-ensiform lobes. *sori* occupying the terminal lobes. Java, 1875. (G. C. n. s., iii. 56.)

PLATYCHILUM. Included under *Hovea*.

PLATYCLINIS (from *platys*, broad, and *clinis*, a couch; alluding to the broad, membranous clinandrium). SYN. *Dendrochilum* (in part). ORD. *Orchideæ*. A genus comprising about eight species (formerly referred to *Dendrochilum*) of stove, epiphytal orchids, with stems tufted at base, or sub-ramose and simple and one-leaved towards the base, and scarcely thickened or narrowly pseudo-bulbous; they are natives of the East Indies and the Malayan Archipelago. Flowers small, in numerous, terminal racemes, shortly pedicellate; sepals narrow, spreading; petals similar or smaller; lip sessile or shortly unguiculate at the base of the column, ovate, concave, almost equalling the sepals; column erect, semi-terete; anthers two-valved; pollen masses four, ovoid. Leaves narrow, contracted into petioles. The species described below, which are those best known to gardeners, thrive well in pots, in a mixture like that recommended for **Liparis.**

P. Cobbiana (Cobb's). *fl.*, sepals and petals sulphur-coloured; lip orange-coloured, flabellate; inflorescence zigzag. *l.* and pseudo-bulbs like those of *Dendrochilum latifolium*. Philippines, 1881. SYN. *Dendrochilum Cobbianum*.

P. filiformis (thread-like). *fl.* pale yellow, small, in long, thread-like racemes. *l.* linear-lanceolate. Pseudo-bulbs small, conical. Manilla, 1836. (I. H. 1878, 323, under name of *Dendrochilum glumaceum*.) SYN. *Dendrochilum filiforme*.

Platyclinis—*continued.*

P. glumacea (glumaceous). *fl.* white, very fragrant, sessile, in a linear-oblong, pendulous, elongated spike, borne on the curved peduncle. *l.* solitary, broad-lanceolate, rather obtuse, striated, tapering into a long footstalk, which is inclosed by the sheathing scale. Pseudo-bulbs crowded, the younger ones clothed with two or more large, generally reddish scales, within which is a much larger, sheathing scale, 3in. to 4in. long, tinged with red. Philippines. (B. M. 4853, under name of *Dendrochilum glumaceum*.)

PLATYCODON (from *platys*, broad, and *kodon*, a bell; referring to the form of the flower). ORD. *Campanulaceæ*. A monotypic genus, the species being a very ornamental, hardy, erect, glabrous, glaucescent, herbaceous perennial. For culture, *see* **Campanula.**

P. autumnalis (autumnal). A synonym of *P. grandiflorum*.

P. chinensis (Chinese). A synonym of *P. grandiflorum*.

P. grandiflorum (large-flowered).* Chinese Bell-flower. *fl.* blue, large, solitary or few at the tips of the branches; calyx tube adnate, turbinate, limb five-parted; corolla campanulate, five-lobed; inflorescence centrifugal. July. *l.* scattered, often opposite or whorled, sub-sessile, ovate, lanceolate, toothed. *h.* 6in. to 12in. China, Mandschuria, and Japan, 1782. See Fig. 199. (S. B. F. G. ser. ii. 208.) SYNS. *P. autumnalis* (L. J. F. 250), *P. chinensis* (L. & P. F. G. ii. 61), *Campanula grandiflora* (B. M. 252).

P. g. Mariesii (Maries'). This is a recently-introduced form, with larger flowers, and of dwarfer habit, than the type. (Gn., March, 1885.)

FIG. 199. UPPER PORTION OF PLANT OF PLATYCODON GRANDIFLORUM.

PLATYCRATER (from *platys*, broad, and *krater*, a bowl; alluding to the expanded calyx of the barren flowers). ORD. *Saxifrageæ*. A monotypic genus, the species being a hardy, prostrate or creeping shrub, with

Platycrater—*continued.*

terete branches. It requires culture similar to **Philadelphus** (which *see*).

P. arguta (sharp). *fl.* greenish-white, scattered, much larger than those of *Hydrangea*, disposed on long pedicels, in terminal, few-flowered corymbs; calyx limb dilated, petaloid, three or four-lobed; petals four, valvate. *l.* opposite, shortly petiolate, deciduous, lanceolate, long-attenuated, acuminate, deeply toothed, veined. Japan, 1866. (R. G. 516; S. Z. F. J. 27.)

PLATYLEPIS (from *platys*, broad, and *lepis*, a scale; alluding to the shape of the sepals). SYNS. *Diplogastra*, *Notiophrys*. ORD. *Orchideæ*. A genus comprising three (or five?) species of stove, terrestrial orchids, natives of tropical and Southern sub-tropical Africa and the Mascarene Islands. Flowers narrow, in dense, sessile, glandular-pubescent spikes; sepals subequal, narrow; petals narrow, sub-coherent with the dorsal sepal; lip sessile at the base of the column, erect, concave-channelled. Leaves ovate or ovate-lanceolate, membranous, contracted into the petioles. Stems ascending, leafy. Rhizome creeping. The species are not known in cultivation.

PLATYLOBIUM (from *platys*, broad, and *lobos*, a pod; in reference to the broad legumes). Flat Pea. ORD. *Leguminosæ*. A small genus (three species) of Australian, greenhouse shrubs, with slender branches. Flowers yellow, solitary, in opposite axils; two upper calyx lobes very large, free or shortly united; lower ones small and narrow; petals clawed; standard orbicular or reniform; wings oblong-obovate, much shorter; bracts brown and scarious. Pods sessile or stipitate, very flat. Leaves opposite, simple, entire, or with pungent angles. For culture, *see* **Hovea.**

P. formosum (beautiful).* *fl.*, standard nearly twice as long as the very hairy calyx; pedicels often fully ½in. long, always exserted from the bracts at their base. July. *l.* from broadly cordate to ovate, or rarely ovate-lanceolate, acute, 1in. to 2in. long, strongly reticulated, with a rigid point. *h.* 4ft. 1790. A handsome shrub. (B. M. 469; P. M. B. xiii. 195.)

P. f. parviflorum (small-flowered). A form with smaller flowers, shorter pedicels, and narrower leaves, than the type. *h.* 4ft. 1792. SYNS. *P. ovatum*, *P. parviflorum* (B. M. 1520; L. B. C. 1241; P. M. B. xi. 219).

P. Murrayanum (Murray's). A synonym of *P. triangulare*.

P. obtusangulum (obtuse-angled). *fl.*, standard shortly exceeding the very hairy calyx, which is about ½in. long; pedicels short, and completely concealed by the imbricate bracts at their base. May. *l.* from broadly triangular to ovate-cordate, hastate, or cordate-lanceolate, mostly ¾in. to 1in. long, with a pungent point, the lateral angles either acute and pungent or rounded and obtuse. *h.* 1ft. 1832. (B. M. 3258.) SYN. *P. triangulare* (B. M. 1508).

P. ovatum (ovate). A synonym of *P. formosum parviflorum*.

P. parviflorum (small-flowered). A synonym of *P. formosum parviflorum*.

P. triangulare (triangular).* *fl.*, standard reniform, deeply emarginate, about twice as long as the calyx, which is adpressedly hairy, and nearly ½in. long. May. *l.* broadly triangular or cordate-hastate, the angles terminating in short, pungent points, or the lower leaves rarely broadly cordate, with the lateral angles rounded, mainly ¾in. to 1in. long. *h.* 1ft. 1832. A straggling or procumbent shrub. SYN. *P. Murrayanum* (B. M. 3259).

P. triangulare (triangular), of Sims. A synonym of *P. obtusangulum*.

PLATYLOMA. Included under **Pellæa** (which *see*).

PLATYLOPHUS (from *platys*, broad, and *lophos*, a crest; the capsule is so much compressed at the apex as to appear winged). SYN. *Trimerisma*. ORD. *Saxifrageæ*. A monotypic genus. The species is an elegant, greenhouse, glabrous, evergreen tree, thriving best in a compost of loam and peat. Propagated, during April or May, by cuttings of ripe shoots, inserted in sand, under a glass.

P. trifoliata (three-leaved). White Alder. *fl.* white, disposed in axillary, long-stalked, many-flowered panicles. June. *l.* petiolate, ternate; leaflets sessile, lanceolate, acuminated, sharply serrated, coriaceous, reticulated with many veins. *h.* 40ft. to 50ft. Cape of Good Hope, 1820. SYN. *Weinmannia trifoliata*.

PLATYMETRA. A synonym of **Tupistra** (which *see*).

PLATYPETALUM (from *platys*, broad, and *petalum*, a petal). ORD. *Cruciferæ*. A small genus of hardy, herbaceous perennials, with purplish flowers, now included, by Bentham and Hooker, under *Braya*. The species have no horticultural value.

PLATYPTERIS. Included under **Verbesina** (which *see*).

PLATYS. A term which, used in Greek compounds, signifies broad; *e.g.*, Platyphyllus, broad-leaved.

PLATYSTEMON (from *platys*, broad, and *stemon*, a stamen; alluding to the expanded filaments). ORD. *Papaveraceæ*. A monotypic genus. The species is a pretty, hardy annual, requiring culture similar to that recommended for **Papaver.**

P. californicus (Californian). Californian Poppy. *fl.* yellow; sepals three; petals six; peduncles elongated. July and August. *l.* narrow, entire; lower ones alternate; floral ones often nearly opposite or ternately whorled. *h.* 1ft. California, 1853. (B. ii. 65; B. M. 3579; B. R. 1679; S. B. F. G. ser. ii. 394.) The variety *leiocarpus* has smooth carpels. (B. M. 3750, under name of *P. leiocarpum*.)

PLATYSTIGMA (from *platys*, broad, and *stigma*; alluding to the broad stigmas). ORD. *Papaveraceæ*. A genus comprising three species of slender, half-hardy, annual herbs, natives of North-west America. Flowers yellow, often small, on elongated peduncles; sepals three; petals six; stamens many; filaments slightly dilated at apex. Leaves narrow, entire, approximate and alternate at the base of the stem, or almost opposite the flowers. For culture of the only species calling for description, *see* **Papaver.**

P. lineare (linear). *fl.* drooping before expansion, then erect; three outer petals full yellow, pale at the sides, obovate, the three inner ones narrower, white, yellow at the claw; scapes several from the same root, 9in. high. May. *l.* radical, linear, acute, glaucous, 2in. to 3in. long. 1833. (B. M. 3575; B. R. 1954.)

PLATYSTYLIS (of Sweet). Now included under **Lathyrus** (which *see*).

PLATYSTYLIS (of Blume). Now included under **Liparis** (which *see*).

PLATYTHECA (from *platys*, broad, and *theke*, a cell; alluding to the broad anther lobes). ORD. *Tremandreæ*. A monotypic genus, the species being an erect, Heath-like, greenhouse shrub or under-shrub. For culture, *see* **Tetratheca.**

P. galioides (Galium-like). *fl.* borne on slender pedicels; sepals narrow-lanceolate, acute; petals blue, with a dark spot at the base. June. *l.* usually about eight in a whorl, narrow-linear, acute and pungent, or obtuse with recurved points, about ½in. long, with the margins often revolute. *h.* 1ft. South-west Australia, 1845. (P. M. B. xiii. 171, under name of *Tetratheca verticillata*.)

PLATYZAMIA. A synonym of **Dioon** (which *see*).

PLATYZOMA (from *platys*, broad, and *zoma*, a band; in allusion to the broad ring of the sporangia). ORD. *Filices*. A monotypic genus. The species—*P. microphyllum*—is an Australian stove fern, closely allied to *Gleichenia*. It has not yet been introduced.

PLEASURE GROUNDS. *See* **Garden.**

PLECOSORUS. Included under *Cheilanthes*.

PLECTOCEPHALUS. Included under *Centaurea*.

PLECTOCOMIA (from *plektos*, plaited, and *kome*, leaves; probably from the leaves being used in plaiting). ORD. *Palmæ*. A genus comprising about half-a-dozen species of stove, climbing palms, allied to *Calamus*, armed with recurved prickles; they are natives of the mountains of India and the Malayan Archipelago. Flower-spikes axillary, divided into numerous, very long, tail-like branches, clothed with two opposite rows of overlapping spathes, each of which incloses a short spike of flowers. Fruit covered with overlapping scales, which are rough and fringed at the edges, giving the fruit a prickly appearance, one-seeded. Leaves large, pinnate, furnished with long, whip-like tails, beset on

Plectocomia—*continued.*

the under side with excessively strong, compound spines, shaped something like a mole's foot, with the claws directed downwards. The species, the best-known of which are described below, are very handsome plants, and are of easy culture. A compost of rich loam and peat, in about equal parts, is suitable. Propagated freely by suckers.

P. assamica (Assamese). *fl.*, spathes 2½in. to 3in. long; spadix large, the branches 2½ft. long. *l.* gracefully arched, broad and deeply bifid when young, ultimately pinnate; upper surface deep green, the under side a beautiful powdery-white. *h.* 80ft. Assam, 1841. An elegant plant. (B. M. 5105.)

P. elongata (elongated). *fl.*, spadix axillary; peduncle covered with imbricate, sheathing spathes. *l.* with the flagelli about 20ft. long; pinnules distant, arched downwards, linear-lanceolate, tapering to both ends, very acuminate, the longest 3ft. in length, 2in. to 3in. broad, coriaceous. Stem, in the lower part, almost as thick as the leg. India, 1869. A gigantic, climbing species.

P. himalayana (Himalayan). *fl.*, spathes almost stem-clasping, conduplicate; branches of the spadix about 2ft. long, covered with rusty tomentum. *l.* ample; pinnules alternate, linear-lanceolate, very acuminate, 1½ft. long, 1⅜in. broad, the margins shortly toothed; pinniferous part of the petioles armed with stout, hooked prickles. Himalayas, 1878. A distinct and graceful palm.

PLECTOGYNE. Included under *Aspidistra.*

PLECTRANTHERA. A synonym of **Luxemburgia** (which *see*).

PLECTRANTHUS (from *plectron*, a spur, and *anthos*, a flower; in allusion to the corolla-tube being gibbous at base). Cockspur-flower. SYN. *Germanea.* ORD. *Labiatæ.* This genus comprises nearly seventy species of stove or greenhouse, perennial herbs, sub-shrubs, or rarely tall shrubs, natives of tropical and South Africa, tropical and sub-tropical Asia as far as Japan, the Malayan Archipelago, Australia, and the Pacific Islands. Flowers small or mediocre, often pedicellate; calyx of five equal or bilabiate teeth; corolla tube exserted, gibbous or oblique; limb bilabiate, the upper lobe three or four-fid, the lower one entire; whorls six to many-flowered, or cymes opposite and more or less evolute, racemose, thyrsoid, or loosely paniculate, rarely densely spicate. Nutlets ovoid or oblong, smooth or minutely dotted. Leaves variable, the floral ones reduced to small, deciduous bracts. The species best known to cultivation are described below. They do well in any light, rich soil. Propagation may be effected by cuttings, which root readily.

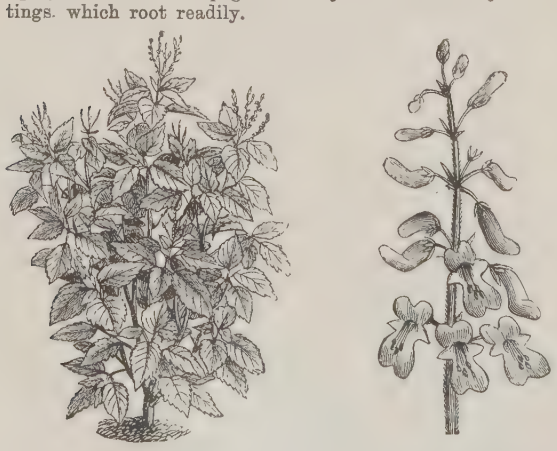


FIG. 200. PLECTRANTHUS FRUTICOSUS, showing Habit and Portion of detached Inflorescence.

P. australis (Southern). *fl.* pale purple, on short, unequal pedicels; corolla almost thrice as long as the calyx: whorls rather loose, about ten-flowered, and ½in. apart; raceme elongated, simple. Summer. *l.* petiolate, broadly ovate, obtuse, inciso-crenate, rounded at base, slightly rugose, pubescent; floral ones round-ovate, deciduous. Stem herbaceous, erect, pubescent. *h.* 2ft. to 3ft. Australia. Greenhouse. (B. R. 1098.)

Plectranthus—*continued.*

P. barbatus (bearded). A synonym of *Coleus barbatus.*

P. coleoides (Coleus-like). *fl.* lilac; corolla four times as long as the calyx; panicle thyrsoid, 6in. long. Summer. *l.* petiolate, ovate, crenate, sub-cordate at base, rather thick, puberulous; floral ones deciduous. *h.* 1ft. to 2ft. Neilgherries, 1865. Stove herbaceous perennial. (B. M. 5841.) SYN. *Coleus Colvillei.*

P. comosus (tufted). A synonym of *Coleus barbatus.*

P. fœtidus (stinking). *fl.* purple (?); calyx softly villous; corolla thrice as long as the calyx; whorls many-flowered, approximate; racemes dense, slightly branched. Summer. *l.* shortly petiolate, broadly ovate, crenate, truncate or cordate at base, thick, much wrinkled, very villous on both sides; floral ones broadly ovate-cordate, acuminate, deciduous. Stem obtusely tetragonal. *h.* 3ft. to 5ft. Eastern Australia, 1877. Greenhouse sub-shrub. (B. M. 6792.)

P. Forskolei (Forskål's. A synonym of *Coleus barbatus.*

P. fruticosus (shrubby). *fl.* blue, elegant, disposed in a slightly-branched panicle; pedicels ⅓in. long; corolla tube twice as long as the calyx. Summer. *l.* petiolate, broadly ovate, sub-cordate, doubly toothed, slightly glabrous; floral ones bract-like. *h.* 3ft. to 4ft. Cape Colony. Greenhouse shrub. See Fig. 200. (R. G. 1864, 431.)

P. ternatus (ternate). Onime-root. *fl.* purple, on short pedicels; corolla dark-dotted, thrice as long as the calyx; whorls ternate, rather loose, many-flowered; racemes simple. August. *l.* long-stalked, ovate-rotundate, acute, deeply crenate, narrowed at base, some fleshy, pubescent above, canescent beneath. Stem erect; branches cano-tomentose or pubescent. *h.* 1ft. Madagascar, 1821. Stove herbaceous perennial. (B. M. 2460.)

PLECTRITIS (from *plektron*, a spur; in allusion to the calcarate corolla). Including *Betckea.* ORD. *Valerianeæ.* A genus comprising only three species of erect, hardy, annual herbs, of which two are Californian, and the third Chilian. Flowers pink, in dense, capituliform cymes, axillary or terminal; corolla five-fid, spreading. Leaves entire or sinuate-toothed. Seeds of *P. congesta* only require to be sown in the open ground in May, in a sheltered situation. It is doubtful, however, whether the genus is still represented in our gardens.

P. congesta (crowded). *fl.* pink, in oval or oblong heads, often arranged in verticillate, approximate or distant glomerules; corolla manifestly bilabiate, with a small spur much shorter than the tube. June. *l.* very glabrous; radical ones obovate or spathulate, entire; cauline ones broadly ovate, sessile, slightly toothed; floral ones linear-oblong. *h.* 9in. to 18in. California, 1826. (B. R. 1094, under name of *Valerianella congesta.*)

PLECTRONIA (from *plektron*, a cock's spur; in allusion to the large spines which are to be found on some of the species). SYNS. *Canthium, Dondisia, Mitrastigma, Phallaria, Psilostoma, Psydrax.* ORD. *Rubiaceæ.* A large genus (about seventy species) of stove or greenhouse, unarmed or spiny, shrubs, sometimes climbing, with terete branchlets; they are natives of tropical Asia, Africa, and Australia, South Africa, and the Pacific Islands. Flowers white or greenish, small, fascicled or disposed in corymbose, pedunculate cymes; calyx with a short tube, and a very short, truncate or four or five-toothed limb; corolla tube short or slightly elongated, with four or five ovate-triangular lobes. Fruit small or mediocre. Leaves opposite, membranous or coriaceous, shortly petiolate, oblong, ovate, or lanceolate; stipules intrapetiolar. Few of the species have been introduced, and none are important horticulturally.

PLECTRURUS. A synonym of **Tipularia.**

PLEEA (named after Aug. Plée, 1787-1825, author of a work on the Flora of the Environs of Paris). ORD. *Liliaceæ.* A monotypic genus. The species is a hardy, perennial herb, with nodose, erect, Rush-like stems or rhizomes. It thrives in peat soil, and requires a moist situation; or it may be grown in pots, placed in pans of water. Propagation may be effected by seeds.

P. tenuifolia (slender-leaved). *fl.* white, greenish without, solitary between the bracts, pedicellate, erect, 1in. wide, disposed in simple racemes; perianth segments spreading. October. *l.*, radical ones few, rather long, linear, erect, somewhat rigid, 6in. to 9in. long; cauline ones one or two, long-sheathed, smaller than the radical ones. Stem 2ft. high. South United States, 1824. (B. M. 1956.)

PLEIONE. Included under **Cœlogyne** (which *see*).

PLEIOS. A term which, used in Greek compounds, signifies more than one; *e.g.*, Pleiophyllus, several-leaved.

PLENUS. Full; double. Applied to flowers in which the number of petals, &c., is abnormally multiplied.

PLEOCNEMIA. Included under **Nephrodium** (which *see*).

PLEOMELE. A synonym of **Dracæna** (which *see*).

PLEOMORPHISM. *See* **Pleomorphy.**

PLEOMORPHY, or **PLEOMORPHISM** (from *pleion*, several, and *morphe*, form; in allusion to the variability in the spores). A term used to express the condition observed in several groups of Fungi (*see* **Oidium, Peronospora, Pleospora, Puccinia,** and **Pyrenomycetes**), in which bodies of two or more forms are produced to effect reproduction of these plants under varying conditions; one form is, in some groups, known to be the result of sexual reproduction, *e.g.*, zygospores of *Peronospora*, ascospores of *Peziza* and *Pyrenomycetes*, &c., and to such the term "spore" is, by some botanists, restricted in theory, though this is scarcely adhered to in practice. All the other forms of bodies specialised for reproduction fall under the two types of conidia and sclerotia. In many plants, conidia of two or more kinds occur, either simultaneously or in succession, and in many Fungi (*e.g.*, *Hymenomycetes*, *Pucciniei*, &c.) no sexual form has yet been detected.

PLEOPELTIS. Included under **Polypodium** (which *see*).

PLEOSPORA. A genus of parasitic Fungi, belonging to the group of *Pyrenomycetes*, and to the sub-group *Sphæriaceæ*, in which the perithecia are globular or flask-shaped, and open by a circular pore or mouth to permit the escape of the spores. The perithecia are borne upon a mycelium, which penetrates the tissues of the host-plant; but they are quite separable from this mycelium. The genus is one of a section in which the perithecia are at first covered by the epidermis of the host-plant, through which, usually, they ultimately burst. The mycelium does not form an evident layer or mass (stroma). The perithecia are not very thick-walled, are dark brown, and generally smooth; the opening, or neck, usually projects from the stratum in which the bodies are sunk. Another form of spore (conidia) is usually produced on the surface on the same host. The spores produced in the asci, inside the perithecia, are divided by numerous cell-walls, crosswise and lengthwise, so as to resemble the arrangement of bricks in a wall, and they are usually some shade of brown, seldom colourless. A number of species of *Pleospora* exist, some parasitic on one plant, some on another; but most of them seem to be found in the perfect condition only on dead or dying stems and leaves, and are thus, in this stage, not hurtful to garden or field produce. A large proportion of the species have been found only on wild plants or on grasses; and there is considerable doubt as to the number of really distinct species, since many of the named forms are only varieties of the extremely common *P. herbarum*. It will be well to give here a brief description of the conclusions of mycologists with regard to the life-history of this species, as it is believed to be injurious to various garden plants in its earlier conditions; and several of these stages differ so much from one another, and from the mature condition, that they have been described as distinct species under widely-separated groups. This Fungus is supposed to be the cause of a disease of Potato-plants, characterised by retardation of growth and curling of the leaves, which become yellowish-green. On the leaf-stalks and stems there appear brown spots, at first round, but widening

Pleospora—*continued.*

out, and, after a time, the whole stalk, with its leaves, withers and dies. The formation of tubers is but small. Various other garden and field plants, and many wild plants, present diseased conditions that are generally referred to the action of *P. herbarum*. Some botanists are of opinion that experimental researches, by means of cultivation of the Fungus, show that two distinct species have been confounded under the name *P. herbarum*, and that these two can be distinguished in the earlier, though not easily, if at all, in the mature, state; and they have been named, by Gibelli, *P. Sarcinulæ* and *P. Alternariæ*. Practically, to gardeners, it matters little whether there are two species or only one, as both forms are common, and they agree in the mode of life.

The Fungus can seldom, if ever, be observed in plants of quite a healthy appearance; but it undoubtedly exerts its action some time before it is externally visible, and, in this period, the food-plant becomes penetrated by its colourless, branched mycelium. On this mycelium, near and on the surface of the plant, are formed the reproductive organs, in the form of conidia of two or three kinds, succeeded by the pycnidia and the perithecia. Both the latter are globular or flask-shaped bodies, with a narrowed neck, and a membranous, leathery or brittle, cellular coat. They are usually scattered plentifully on the surface of dead stems and leaves. The pycnidia are full of minute,

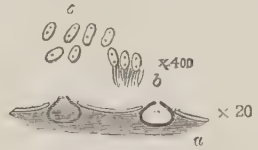


FIG. 201. PLEOSPORA HERBARUM, PYCNIDIAL STAGE (known as *Phoma herbarum*)—*a*, Pycnidia in transverse section, × 20, one opened; *b*, Conidia still on the Stalks, × 400; *c*, Conidia free after falling off the Stalks, × 400.

elliptical, transparent, one-celled bodies (see Fig. 201), borne on slender stalks from the inner surface of the walls. The perithecia are larger and darker than the pycnidia, and differ from these in the spores contained in them being inclosed in large, transparent, elongated, cells (asci). In each of these are eight spores (see

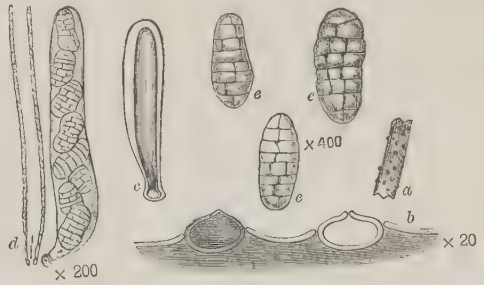


FIG. 202. PLEOSPORA HERBARUM, PERFECT STAGE, WITH ASCI—*a*, Piece of Herbaceous Stem, with Perithecia, natural size; *b*, Section of Stem, with two Perithecia, one opened, × 20; *c*, Unripe Ascus, × 200; *d*, Ripe Ascus, × 200, inclosing eight ripe Spores; *e*, *e*, *e*, Three Ripe Spores, × 400, showing differences in size, form, and divisions.

Fig. 202). The latter are some shade of brown, elliptical, narrowed in the middle, and show numerous partitions, of which seven are across the length, and others divide the spaces so formed into smaller spaces or cells. They are very much larger than the spores contained in the pycnidia. The conidia are formed, not in special receptacles, as in the former cases, but exposed on the surface of the plant. One of the earliest Fungi to appear on sickly plants in general is a bluish or greenish-grey coat

Pleospora—*continued.*

of erect filaments, each bearing on, or near, the tip one or two conidia of a cylindrical or elliptical form, and entire or two-celled. This Fungus, known as *Cladosporium herbarum* has long been regarded as an ill-developed condition of *Pleospora herbarum*; but recently it has been denied that *C. herbarum* is a stage in the development of *P. herbarum*. Other forms of conidia also occur, intermingled with the *Cladosporium*, which are admitted to be conditions of *P. herbarum*. These

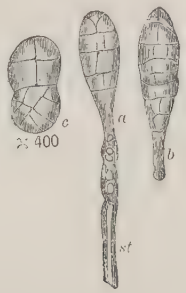


FIG. 203. PLEOSPORA HERBARUM, MACROSPORE STAGE (known as *Macrosporium sarcinula*)—*a*, Conidium on Stalk (*st*); *b*, Conidium after falling from Stalk; *c*, Another Form of Conidium, more typical of *Sarcinula* Stage: all × 400.

latter forms (see Fig. 203) resemble, in their general appearance, the spores from the asci, *e.g.*, in the forms *Macrosporium sarcinula*, *Sporidesmium*, and *Alternaria Brassicæ*. Of these forms of conidia, *Macrosporium* and *Sporidesmium* are oblong, with blunt ends, and are divided, as shown in Fig. 203, both lengthwise and crosswise, by partition walls, and each conidium is produced on the end of a separate stalk. *Alternaria* has conidia produced on stalks, which may be sparingly branched; on the tip of each branch is a row of pear-shaped, many-celled conidia, attached by the broader end, and these separate very readily. The two forms *Macrosporium* and *Alternaria* are regarded by Gibelli as characteristic of the two species into which he divides *P. herbarum*, as mentioned above. All the forms of conidia now described germinate readily, and, in suitable conditions of moisture and nourishment, produce mycelium, which produces the Fungus anew. On the relationship of *Cladosporium herbarum* to the other forms greatly depends the view that must be taken of the disease-producing power of *P. herbarum*, and further investigations are required on this point.

Remedies. Unfortunately, these are hardly procurable, because of the wide diffusion and abundance of the Fungi, and the internal parasitism of the mycelium; but all diseased parts should be burned. The best method to prevent damage is to promote, in every way, healthy growth in the plants most liable to be attacked.

PLEROMA (from *pleroma*, fulness; referring to the cells of the capsule). SYN. *Lasiandra*. Including *Chætogastra*, *Melastoma*, *Micranthella*, and *Rhexia* (in part). ORD. *Melastomaceæ*. A genus containing about 124 species of stove or greenhouse shrubs and sub-shrubs, rarely perennial herbs, sometimes climbing, often strigoso-pilose or hispid, natives of tropical South America, being mostly Brazilian. Flowers violet or purple, usually disposed in terminal, trichotomously-branched panicles, large, sometimes with concave involucral bracts, very rarely four-parted; calyx tube ovoid, campanulate, urceolate, or elongated; lobes five, as long as, or longer than, the tube; petals five, obovate, often unequilateral and retuse. Leaves frequently large, coriaceous, petiolate, ovate or oblong, entire, three to seven-nerved. The species thrive either in turfy loam or peat, preferably the former, and cuttings of half-ripened shoots root

Pleroma—*continued.*

readily in a close frame at almost any time of year when they can be obtained. *P. elegans* forms a fine exhibition plant when well grown, and *P. macranthum* is one of the most beautiful subjects for covering a pillar or rafter in a greenhouse or cool stove. A season of rest should be allowed Pleromas in winter; but plenty of water may be applied through the summer. Except where otherwise stated, the under-mentioned species are shrubs, and require stove treatment.

P. Benthamianum (Bentham's).* *fl.* of a beautiful dark purple, almost white in the centre, about 2in. across; panicles terminal, glanduloso-pilose. Autumn. *l.* oblong-lanceolate, rounded or somewhat cordate at the base, acute, nine-nerved, entire, the upper surface rough with small setæ, the lower covered with adpressed, silky hairs. *h.* 4ft. Organ Mountains, 1841. (B. M. 4007.)

P. elegans (elegant).* *fl.* rich blue, large, produced in abundance during May and June. *l.* opposite, ovate-acuminate, bright shining green. *h.* 5ft. Organ Mountains, 1844. (B. M. 4262.)

P. Gaudichaudianum (Gaudichaud's). *fl.* rosy-purple, in terminal panicles. Summer. *l.* petiolate, ovate, acuminate, beset with small, softish bristles. Branches tetragonal, rough from small, adpressed bristles. *h.* 2ft. to 3ft. Brazil, 1836. SYNS. *Lasiandra petiolata* (B. M. 3766), *Pleionema Gaudichaudiana*, *Rhexia petiolata*, and *R. petiolaris*.

P. Gayanum (Gay's).* *fl.* white, in terminal panicles. Late autumn. *l.* ovate-oblong, acute, serrate, hairy. *h.* 1ft. to 2ft. Peru, 1874. Herb. (B. M. 6345.)

P. granulosum (granulose). *fl.* reddish-purple, very showy, almost 3in. in diameter; corolla concave, rotate; petals obovate-oblong, acuminate, shortly apiculate; panicles terminal, with decussate branchlets. *l.* coriaceous, decussately opposite, entire, attenuated at both ends, five-nerved; petioles much shorter than the leaves. *h.* 10ft. Brazil. (B. R. 671.) SYN. *Lasiandra Fontanesiana* (R. G. 1865, 466).

P. heteromallum (one-woolly-sided). *fl.*, petals purplish-violet five or six, obcordate; calyx pubescent, with deciduous teeth; filaments short, conniving. July to September. *l.* oval-cordate, stalked, beset with flocky wool beneath. *h.* 4ft. to 6ft. Brazil, 1819. SYN. *Melastoma heteromalla* (B. M. 2337; B. R. 664).

P. holosericeum (silky). *fl.* purple; thyrse panicled, terminal, with the rachis very villous and compressed; calyx tubular. July. *l.* sessile, ovate, five to seven-nerved, entire, densely silky-villous on both surfaces. Branches tetragonal, clothed with adpressed bristles. *h.* 6ft. to 10ft. Brazil, 1816. A beautiful species. SYNS. *Lasiandra argentea*, *Rhexia holosericea* (B. R. 323; L. B. C. 236).

P. Kunthianum (Kunth's). A synonym of *P. semidecandrum*.

P. macranthum (large-flowered).* *fl.* rich deep violet-purple, about 5in. in diameter, solitary, freely produced at the ends of the branchlets. Winter. *l.* ovate or oblong-ovate, acuminate, rugose. Branches slender, terete. Brazil, 1864. A very beautiful plant, flowering the more profusely when in a large state, and forming one of the most effective subjects for greenhouse or conservatory decoration. It is best suited for trellises or walls, and, for this purpose, should be planted out, or placed in large tubs or boxes, after the first year's growth. (B. M. 5721.) SYN. *Lasiandra macrantha*.

P. m. floribundum (floriferous). *fl.* of a rich and brilliant violet-blue, produced almost throughout the year, and measuring nearly 1½ft. in circumference. St. Catherine's, Brazil, 1870. A most beautiful variety, producing its gigantic flowers on young plants when only about 3in. in height. It is better suited for pot culture than the type.

P. sarmentosum (twiggy).* *fl.* deep violet or violet-purple, upwards of 2in. in diameter, and disposed in trichotomous panicles. *l.* ovate or ovate-oblong, shortly stalked. Branches sarmentose. *h.* 1ft. to 2ft. Cool valleys of Peru, 1867. A beautiful, greenhouse, sub-shrubby plant. (B. M. 5629.)

P. semidecandrum (five-stamened). *fl.* purple; petals very obtuse; calyx tube campanulate, rigidly setose; pedicels hispid, axillary, one-flowered, and terminal. July. *l.* petiolate, oblong, acute, five-nerved, entire, setuloso-scabrous above, villous beneath. Branches tetragonal, and, as well as the petioles, villous. Brazil. SYN. *P. Kunthianum* (B. M. 4412).

P. villosum (villous). *fl.* rosy-pink, terminal, few, pedunculate; petals obovate, retuse, mucronate. May and June. *l.* ovate, acute, entire, villous, five-nerved. Branches terete, villous beneath. *h.* 3ft. to 4ft. 1820. SYN. *Melastoma villosum* (B. M. 2630; L. B. C. 853).

P. vimineum (twiggy). *fl.* purple; calyx covered with glandular hairs, the segments lanceolate and mucronate. July and August. *l.* ovate-lanceolate, acute, petiolate, and, as well as the branches, scabrous, but canescent beneath. *h.* 6ft. Brazil, 1821. SYN. *Rhexia viminea* (B. R. 664).

PLEURANDRA (of Labillardière). Included under **Hibbertia** (which *see*).

PLEURANTHE. A synonym of **Protea** (which *see*).

PLEURIDIUM. Included under **Polypodium** (which *see*).

PLEUROGRAMME. Included under **Monogramme** (which *see*).

PLEUROGYNE (from *pleuron*, a side, and *gyne*, the female organ; referring to the stigmas issuing from the side of the seed-vessel). Syn. *Lomatogonium.* Ord. *Gentianeæ.* A small genus (three species) of slender, annual herbs, natives of the mountains of Eastern and Arctic Europe, Asia, and North America. Corolla wheel-shaped, fringed at the throat. Leaves opposite. The species are probably lost to cultivation.

PLEUROPETALUM (from *pleuron*, a side, and *petalon*, a petal; in allusion to the shape of the corolla). Syn. *Allochlamys.* Ord. *Amarantaceæ.* A genus comprising only a couple of species of slightly-branched, stove, glabrous shrubs, natives of Mexico, Ecuador, and the Galapagos Islands. Flowers greenish, at length red, small, disposed in terminal, branched panicles, sessile or pedicellate; perianth of equal, oblong, obtuse, concave segments; stamens five to eight. Leaves alternate, rather large, membranous, elliptic-lanceolate, long-acuminate, entire or with slightly undulated margins, narrowed into a rather long petiole. Only one of the species has been introduced to our gardens. It requires culture similar to **Codiæum** (which *see*).

P. costaricense (Costa Rica). *fl.* green, at length scarlet, small, very numerous, in terminal and axillary, sub-corymbose, much-branched panicles, shortly pedicellate; perianth segments five. Autumn. *l.* petioled, alternate, 4in. to 5in. long, elliptic-lanceolate, acuminate, with the tip often drawn out; margin even, or obscurely undulate. Central America and Mexico, 1883. A small shrub, with green branches. (B. M. 6674.) Syn. *Melanocarpum Sprucei.*

PLEUROSPERMUM (from *pleuron*, a side, and *sperma*, seed; in allusion to the size of the fruit ridges). Syns. *Aulacospermum, Hymenolæna, Physospermum.* Ord. *Umbelliferæ.* A genus comprising about fifteen species of hardy, tall or dwarf, glabrous, biennial or perennial herbs; three are natives of mostly Eastern Europe and Russian Asia, and the rest are all Himalayan. Flowers white or dark purple; petals obovate or cuneate, rather large for the order; bracts of the involucres and involucels indefinite, sometimes coloured; umbels compound, many-rayed. Leaves pinnate or pinnately decompound; segments ovate, toothed, incised, or cut into narrow laciniæ. Only one species calls for description here. It thrives in any common soil, and may be readily increased by seeds, or by divisions.

P. austriacum (Austrian). *fl.* white; involucre many-leaved. Summer. *l.* bipinnatisect; the segments pinnatifidly cut into acute lobes. Stem fistular. *h.* 2ft. to 3ft. South Europe, 1597. Perennial. (A. F. P. 43; J. F. A. 151.)

PLEUROTHALLIS (from *pleuron*, a side, and *thallo*, to blossom; in allusion to the inflorescence). Syn. *Humboldtia.* Including *Centranthera, Rhyncopera,* and *Specklinia.* Ord. *Orchideæ.* A vast genus (nearly 350 species have been described) of stove orchids, of variable habit, natives of the West Indies and tropical America. Flowers small, sometimes very small, in a few species mediocre or rather large, often secund, in bundle-flowered racemes; sepals erect, connivent or somewhat spreading; petals shorter or narrower; pollinia two; labellum usually articulated at the base of the column. Stems filiform, one-leaved, often sheathed. The species have scarcely any ornamental value, but are curious and interesting from a botanical point of view. A selection from those best known to cultivation is given below. They may be grown either in baskets or pans, suspended from the roof of a cool house, most of them thriving along with the Masdevallias. The small ones, such as *P. Grobyi*, are best fastened to little tufts of peat or to Fern stems.

Pleurothallis—*continued.*

P. atropurpurea (dark purple). *fl.* dark purple, solitary; bud ¼in. long; petals oblique, three-cusped; lip obtuse, sagittate, crested in the middle. *l.* oblong, narrowed at base, almost equalling the stem; sheaths ventricose. *h.* 6in. Jamaica, 1838. (B. M. 4164, under name of *Masdevallia fenestrata.*)

P. aviceps (bird's-head). *fl.* green, with yellow petals and lip, resembling the beak of a bird. *l.* numerous, oblong-lanceolate. Brazil, 1871. A pretty little plant, of tufted habit.

P. Barberiana (Barber's). *fl.* few, on a slender peduncle, four or five times as long as the leaves; sepals light ochre, blotched with dark purple, aristate, free, ciliated; petals whitish, smaller, serrate; lip cuneate, oblong-clavate. *l.* very small, elliptical, acute, thick, keeled beneath. Tropical America, 1881. A small but pretty orchid.

P. bicarinata (two-keeled). *fl.* dull greenish-yellow, in a few-flowered raceme; sepals aristate, the upper one bifid and bicarinate; petals oblong, minutely serrulate; lip obovate, fleshy, cordate. *l.* oblong, 5in. long, 1⅜in. broad; sheath on stem 1¾in. long. *h.* 6in. Brazil. (B. M. 4142.)

P. bilamellata (two-ridged). *fl.* cinnabar-red, two or three at the base of a leaf, minute. Rhizome creeping, bearing numerous stems, each terminating in one cuneate-ligulate, very thick, fleshy leaf. Mexico, 1870. (Ref. B. 95.)

P. fulgens (brilliant). *fl.* brilliant cinnabar-red, one to three on a peduncle ½in. long; petals washed with greenish-purple; lip of a paler cinnabar. *l.* spathulate-obovate, minutely tridentate at the apex. Stems very short. Costa Rica, 1875. This species is of densely tufted habit.

P. Grobyi (Groby's). *fl.* yellow, streaked with crimson, small, about a dozen in a loose, zigzag raceme; sepals costate, acute, the upper one bidentate; petals membranous, acute; lip fleshy, oblong, obtuse. *l.* obovate, emarginate, petiolate, forming small, dark green tufts. *h.* 3in. Brazil, 1834. (B. M. 3682.)

P. Lanceana (Lance's). *fl.* yellow, crimson at the base inside, in a pendulous spike; sepals linear-lanceolate, the upper one bidentate; petals setaceo-acuminate, fimbriate; lip unguiculate. *l.* fleshy, broadly oblong. *h.* 6in. Surinam, 1831. (L. B. C. 1767.)

P. picta (painted). *fl.* yellow, striped with crimson, in a nearly straight raceme; sepals smaller than in *P. Grobyi* (which this species closely resembles). *l.* narrow-spathulate, longer than the peduncle, and overtopping the lowest flowers. Demerara, Surinam, &c. (B. R. 1825.)

P. prolifera (proliferous). *fl.* deep purple; sepals slightly scabrous; petals pale, linear-lanceolate, serrated upwards; lip oval, fimbriate at base. *h.* 6in. Brazil, 1826. "The formation of leaves, in place of flowers, which gave rise to the specific name, occurs occasionally in many other species" (Lindley). (B. M. 3261; B. R. 1298; L. B. C. 1908.)

P. Reymondii (Reymond's). *fl.*, sepals orange, brown, and green, pubescent, oblong, the dorsal ones larger; petals two-lobed, one rounded, the other elongated; lip minute. *l.* coriaceous, linear-lanceolate, obtuse, acuminated, shorter than the stem. *h.* 6in. Venezuela, &c., 1863. (B. M. 5385.)

P. saurocephala (lizard-headed). *fl.* yellowish-green, changing to light brown, closely dotted with purple inside, disposed in an erect, imbricated spike; dorsal sepal twice as broad as the upper ones. *l.* 4in. long, 2in. broad, coriaceous, broadly oblong, equalling the angular stem. Brazil, 1829. (B. M. 3030; B. R. 1968; L. B. C. 1571.)

P. scapha (skiff). *fl.* yellowish-white, marked with purple lines, except the lower sepals, which are wholly dark brownish-purple; racemes lax, many-flowered. *l.* ovate, coriaceous. 1874. A fine species. (G. C. n. s., xv. 784.)

P. spectrilinguis (tongue like). *fl.* hyaline, disposed in sub-corymbose racemes; sepals spotted with mauve-purple, aristate; lip dark olive-brown, with basilar, retrorse horns, and an elliptic, fringed blade. *l.* narrow-spathulate, about 1in. long. 1883. A small species.

P. strupifolia (strap-leaved). *fl.* in racemes, 3in. to 4in. long, with loose, funnel-shaped, spreading bracts; dorsal sepal, petals, and lip, white, spotted and striped with purple; front sepal all purple-speckled. *l.* resembling long straps, 1½ft. long, sometimes broader and shorter. *h.* 1½ft. Mexico, 1838. (B. M. 3897, under name of *P. picta.*)

PLICATE. The same as **Plaited** (which *see*).

PLOCAMA (from *plokamos*, bent hairs; alluding to the pendulous branches). Syns. *Bartlingia, Placodium, Placoma.* Ord. *Rubiaceæ.* A monotypic genus. The species is a greenhouse, erect shrub, with very slender, pendulous branches. A compost of loam and peat is most suitable for its culture. It may be increased readily by cuttings, which will root in sand, under a glass.

P. pendula (pendulous-branched). *fl.* white, minute, axillary and terminal; calyx with a globose tube, and a five-toothed, persistent limb; corolla infundibular-campanulate, with a short tube and a limb of five to seven oblong-lanceolate, valvate lobes. *l.* opposite, or in whorls of four, linear-oblong, filiform, acute, flaccid; stipules connate with the petioles. *h.* 2ft. Canary Islands, 1772.

PLOCOGLOTTIS (from *plokos*, a fold, and *glotta*, a tongue; referring to a fold in the lip). ORD. *Orchideæ*. A genus comprising eight species of stove, terrestrial orchids, with the habit of *Eulophia*, natives of the Malayan Archipelago. Flowers mediocre, shortly pedicellate, racemose; sepals connate beneath the lip, larger than the petals, which are curved at the apex; lip connate with the column on either side by inflexed, membranous folds, its limb being convex, undivided, patent, at first erect; column free above; anthers two-celled; pollinia four, round, with two long, replicate caudicles; peduncles or scapes leafless. Leaves ample, membranous, plicate. Stem or rhizomes creeping, one or many-leaved, not distinctly pseudo-bulbous at base. For culture of *P. Lowii*, the only species introduced, *see* **Cyrtopodium.**

P. Lowii (Low's). *fl.* ochre-coloured, spotted with brown, borne in a spike on a long, hairy scape. *l.* cuneate-oblong. Pseudo-bulbs obpyriform. Borneo, 1865. (R. X. O. 154.)

PLOCOSTEMMA. Included under *Hoya.*

PLŒSSLIA. A synonym of *Boswellia.*

PLOUGHMAN'S SPIKENARD. *See* **Baccharis.**

PLUCHEA (so called after N. A. Pluche, who published the "Spectacle de la Nature," at Paris, in 1732). Marsh Fleabane. SYNS. *Conyza* (in part), *Gymnema* (of Rafinesque), *Leptogyne*, *Stylimnus*. Including *Karelinia*. ORD. *Compositæ*. A genus comprising nearly thirty species of greenhouse, tomentose, villous, or sometimes glutinous shrubs or sub-shrubs, rarely hardy perennial herbs, natives of the warmer regions of America, Africa, Asia, and Australia. Flower-heads white, yellow, or lilac, heterogamous, in the typical species small, disposed in corymbose, leafless, terminal cymes; in a few species, larger and solitary at the apices of the branches, or rather large and crowded at the tips of leafless branches; involucre ovoid, broadly campanulate or subhemispherical, the bracts few or many-seriate; receptacle flat, naked; achenes glabrous or pilose. Leaves alternate, toothed, or rarely entire or pinnatifid. Few of the species are of any horticultural value. *P. caspica* is of very easy culture in the open border, and may be propagated by seeds, or by divisions.

P. caspica (Caspian). *fl.-heads* purple, cylindrical, terminal, corymbose. August. *l.* oblong, lanceolate, entire. *h.* 2ft. to 3ft. Borders of Caspian Sea and Siberia. Hardy, herbaceous perennial. SYN. *Karelinia caspia.*

PLUM. The origin of many of our cultivated Plums is quite unknown; several of them, no doubt, have sprung from *Prunus domestica*, but, in all probability, other wild types have contributed. According to some authorities, the Sloe, or Blackthorn (*P. spinosa*), the Bullace (*P. insititia*), and the Wild Plum (*P. domestica*) are merely sub-species, and are united into one species under the name of *P. communis*, which is found in a wild state throughout Europe and West Africa. "The Sloe is confined to Europe, the Bullace extends to North Africa and the Himalaya" (Hooker). The Plum is a deciduous tree, attaining a height of from 15ft. to 20ft., and forming a moderately spreading head. From the amount of information which is at command regarding Plums, it would seem that various sorts were introduced into this country from France and Italy during the fifteenth century. The fruit has, therefore, been grown from a remote period, and the date when its cultivation first began is very uncertain. Plums are the hardiest of stone-fruits, and the crop is one of the most remunerative, in all favourable seasons, from market gardens and cultivated orchards. In private establishments, the fruits of all the best varieties are much valued for dessert, and those of the coarser and less highly-flavoured ones prove invaluable for cooking and preserving. For the latter purpose, hundreds of tons of the fruit are, in a favourable season, sent from the surrounding market gardens to London alone. The crop

Plum—*continued.*

is therefore one of the most important, both for market and for private consumption. A fruiting branch is represented at Fig. 204.

Propagation. Budding and grafting are the chief methods by which varieties of Plums are propagated. Young trees may also be readily raised from seeds, and from suckers. Suckers are only occasionally used, and should never be employed as stocks. The Plum is naturally inclined to spread its roots, and throw up numerous suckers; and, if these are replanted, or used as stocks, the tendency to be constantly throwing up other shoots from the base is afterwards apparent. Some sorts reproduce themselves nearly true from seeds, as, for instance, the Green Gage; but seedlings generally vary more or less from the original, and it is, therefore, best not to depend on this mode of propagation beyond the raising of seedlings as stocks, except, perhaps, with Damsons, which may be raised from the stones. Plum stocks are required in large numbers for Peaches, Nectarines, and Apricots, as well as for Plums. The seeds

FIG. 204. FRUITING BRANCH OF PLUM.

may be sown when taken from the fruit; or they may be stratified, and sown in autumn or early spring. In the autumn following, the stocks will be ready for transplanting into nursery lines, preparatory to budding or grafting when large enough. For Plum stocks, the varieties best suited are the Damson, Mussel, St. Julien, and White Pear. The Mussel answers well as a stock for standard trees. Shield-budding in July and August, and ordinary cleft-grafting in March, or just before the sap ceases to flow in September, are the most successful methods to adopt. In budding, it is most important that wood, and not blossom, buds be inserted; and, in grafting, wood-buds, which are sometimes very scarce on scions, must be carefully preserved. Stocks for grafting must be prepared by being headed-down early in the year, before growth begins; and the scions should be cut at the same time, or even earlier, and laid with their ends in the ground. Attention must specially be given to this particular, or a successful union of the parts at grafting-time will be out of the question. Standard Plums may be worked near the ground, and the scion allowed to make its own stem, or at the proper height,

Plum—*continued.*

according as the variety may be a vigorous or a weak-growing one. New varieties are raised from seeds.

Soil and Situation. Plum-trees succeed in any fairly good loamy soil, provided the subsoil is open and properly drained. The ground should be well trenched previous to planting, although the roots of Plums are naturally disposed nearer to the surface than those of Apples and Pears. In a very rich soil, the growths usually made are too vigorous to become well ripened; in that which is moderately light, yet sufficiently moist, the trees succeed and produce the best-flavoured fruits. Respecting flavour, however, much depends on the amount of sunshine and light available. In market gardens, where the trees under notice are very extensively grown, they are planted in lines ranging from 15ft. to 20ft. apart, and the intervening spaces are occupied with Gooseberries and Currants. Standards and half-standards are generally favoured; but dwarf and bush-trees are also extensively planted in market as well as in private gardens. All the finer dessert sorts should, if possible, be favoured with wall space in private establishments, as their fruits are invariably of so much importance, and the crop is more certain with the protection of a wall than when the trees are fully exposed. A temporary covering, while the blossoms are open, may also be readily applied, should frost or unfavourable weather prevail. In a southern aspect, the fruits attain their highest flavour; but this position is usually required for Peaches and other trees that are less hardy than Plums, and the latter are relegated to the walls with an eastern or western exposure—positions in which they succeed admirably. As already noted, the roots of Plum-trees run near the surface, and especially is this the case when the soil is left undug. All the available border space is invariably required for numerous crops; and if a width of about 2ft. or 3ft. is left untouched next the wall, the other portion may be dug and cropped annually. The digging-over of this portion should not, however, be left longer than one season without being attended to, or the young roots will ascend, and the work cannot be performed without cutting them off.

Pruning, Training, &c. For Plum-trees against walls, the fan method of training is the best, as one or other of the branches is liable to die off occasionally, and its place can be more readily occupied by those next situated than would be possible with another method, as, for instance, horizontal training. For the open ground, standards, half-standards, pyramids, and bush trees, are available, as already stated. Mr. Rivers states that "Plums form most fertile oblique cordons; no matter how the shoots are pinched, they will produce large crops of remarkably fine fruit, and continue to bear in spite of excessive pinching, forming cylinders of fruit; their worst tendency is to excessive growth, which must be checked by root-pruning." Plums are admirably adapted for culture in pots: late sorts, which can only be ripened with difficulty outside, arrive at great perfection under glass. *See* **Orchard House.** The fruit of the Plum is produced on small spurs, which form in great quantities on the ends and along the sides of bearing shoots of from one to three years' growth—that is, supposing they are well ripened. In pruning, therefore, these spurs should be carefully preserved, and also a sufficient quantity of young wood kept annually to replace any which becomes old and unfruitful. The main branches on a fan-trained tree should be allowed plenty of space, and any irregular or misplaced ones removed, after provision can be made for filling their places with others of a better description. Summer pruning consists in shortening back the young shoots, treating the upper part of the tree first, to encourage the production of blossom-buds on the short spurs left. At the winter pruning, weak and unripened wood form the chief parts to be cut away. If Plum-trees become unfruitful, because of vigorous wood-

Plum—*continued.*

growth, they should be lifted early in autumn, and root-pruned. It has been recommended that pyramid trees should be lifted and replanted, if necessary, every two years; this operation gives them a proper check, and greatly increases their fertility. Standard Plum-trees in the open ground, when once they are properly started, require but little pruning or training, unless the heads become too much crowded, when the weak wood should be cut out. If vigorous shoots appear, as they often will, in the centre of a young tree, they should be pinched at an early stage, in order to check the sap. Such shoots seldom ripen properly on any fruit-tree, and their production should not be encouraged. Sometimes excessive vigour may be materially checked by simply clipping off a quantity of the leaves, on shoots so disposed, across the centre, with a view to arresting the flow of sap to the leaves, and thus indirectly affecting its progress to unduly enlarge the shoot.

Plums intended for dessert should be allowed to hang until they are nearly ready to drop from the tree; when only required for cooking, it is not of so much importance. The bloom on choice fruits should be carefully preserved, by handling only the stem when gathering them, and placing single layers in a shallow basket or box for transmitting to a cool fruit-room. Fruits with their bloom uninjured by rubbing are better able to withstand atmospheric changes than are those roughly handled, the bloom being their natural protection. Some few sorts, amongst which Coe's Golden Drop is a well-known example, will keep good for dessert a long time after being gathered, if wrapped in paper, and stood in a dry, airy place: these fruits attain their highest flavour when they become partially shrivelled. Plums and Damsons for cooking may be sent, before they get too ripe, very long distances, by being packed closely in a box, with a little soft chaff shaken in to fill up interstices between them. That cut from Oat straw is the best.

Sorts. The following list includes most of the best varieties of Plums, both for dessert and kitchen use, which ripen from the early until the latter part of the season. There are many others in cultivation which it is thought unnecessary to refer to here, but it is not unlikely that some are omitted which should have had their merits recognised. Plenty are, however, enumerated for all purposes.

Angelina Burdett. Fruit round, of medium size; skin dark purple, thickly covered with brown spots and a blue bloom; flesh very rich and juicy. A good dessert Plum, which ripens early in September, and may be kept until it shrivels, when the flavour is very rich.

Autumn Compôte (Rivers'). Fruit oval, very large, bright red, and handsome, of first-rate quality for preserving. End of September. A valuable, late culinary variety.

Belgian Purple. Fruit medium or large, roundish, deep purple flesh juicy and richly flavoured. Middle of August. Dessert or kitchen.

Belle de Septembre. Fruit large and handsome, roundish-oval, reddish-purple, covered with yellow spots and a thin bloom. Early in October. An excellent kitchen sort. The tree is an enormous bearer.

Blue Impératrice. Fruit medium, roundish-ovate, deep purple, with thick, blue bloom; flesh rich, but not very juicy. October. An excellent variety for preserving and for dessert; when allowed to hang, the fruits become very richly flavoured. The tree is an excellent bearer; it should be grown against a wall.

Bryanston Gage. Fruit large, round, green, blotched with red; flesh juicy and rich. September. A large and excellent variety of GREEN GAGE, which ripens about a fortnight later than the last-named. Dessert.

Coe's Golden Drop. Fruit very large, oval, pale yellow, with numerous dark red spots; flesh juicy, rich, and most delicious when well ripened. End of September. One of the finest late Plums for dessert or preserving. The tree deserves a wall, but bears well in the open; it is also well adapted for pot culture.

Cooper's Large. Fruit medium or large, oval, dark purple next the sun, with numerous brown dots; flesh juicy, and of rich flavour. End of September and beginning of October. Dessert

Plum—*continued.*

De Montfort. Fruit medium sized, roundish, dark purple, with thin, blue bloom; flesh juicy, rich, and excellent, particularly when the fruit shrivels. Middle of August. A first-rate dessert Plum which resembles ROYAL HÂTIVE, but the fruits are larger.

Denniston's Superb. Fruit rather large, nearly round, greenish-yellow, marked with a few blotches, and covered with bloom; flesh juicy, rich, and deliciously flavoured. Middle of August. Dessert. The tree is very hardy, and a great bearer.

Diamond. Fruit very large, oval, deep purple; flesh juicy, and briskly flavoured. Middle of September. One of the finest culinary Plums known. Tree vigorous, and an excellent bearer.

Early Favourite (Rivers'). Fruit medium, roundish-oval, dark purple, covered with a thin bloom; flesh juicy, and of excellent flavour. Middle of July. Mr. Rivers states, in his catalogue, that it "requires a wall with south or south-west aspect, and is then the earliest of all early Plums."

Early Rivers (Rivers'). Fruit oval, medium sized, deep purple; flesh juicy, sweet, and brisk. End of July. A good, early Plum, and a great bearer; valuable for preserving, because the fruits, though not large, are unusually heavy. This variety is also sometimes called EARLY PROLIFIC.

Goliath. Fruit very large, oblong, reddish-purple. End of August. A large, showy Plum, best suited for culinary purposes and preserving.

Grand Duke (Rivers'). Fruit very large, purple, with blue bloom. Middle of October. Kitchen. A seedling raised by Mr. Rivers from AUTUMN COMPÔTE; a valuable addition to late varieties, either for market or private gardens.

FIG. 205. FRUITING BRANCH OF GREEN GAGE PLUM.

Green Gage. Fruit round, medium sized, yellowish-green, marked, when ripe, with faint crimson spots, and covered with a grey bloom; flesh tender, melting, and of a most delicious flavour. End of August. Well known as being one of the richest-flavoured of all Plums, invaluable for dessert, and amongst the very best for preserving. The tree is hardy, and an excellent bearer; it produces the largest fruits on a wall, but the most richly-flavoured ones are generally those from standards grown in the open ground. See Fig. 205.

Guthrie's Late Green. Fruit large, round, yellowish-green, covered with a thin bloom; flesh yellow, firm, and very rich. Middle and end of September. A valuable late dessert Plum. The tree is hardy, and very productive.

Hulings' Superb. Fruit very large, roundish-oval, yellow; flesh rich, sugary, and highly flavoured. End of August. A fine large dessert Plum.

Ickworth Impératrice. Fruit medium or large, purple; flesh tender, juicy, and of rich flavour. October. An excellent late dessert variety; the fruits, if allowed to hang until they shrivel, attain a high flavour; after being gathered, they may be kept for a long time in a dry place, if wrapped in soft paper.

Impériale de Milan. Fruit large, oval, dark purple, dotted with yellow; flesh yellowish, juicy, and rich. Beginning of October. Good for dessert and preserving; late.

Jefferson. Fruit large, oval, yellow, mottled with red; flesh firm, juicy, and deliciously flavoured. Beginning of September. One of the finest dessert Plums. The tree is an abundant bearer.

July Green Gage. Fruit similar in size and shape to the GREEN GAGE; it is also of equally good quality, and may be considered a very valuable early variety. End of July.

Plum—*continued.*

Kirke's. Fruit medium, round, dark purple, covered with a dense, blue bloom; flesh firm, juicy, very richly flavoured. Middle of September. A delicious dessert Plum, one of the best. The tree is very hardy and productive.

Late Green Gage. Fruit smaller than the GREEN GAGE, round, greenish-yellow; flavour rich and good. A good late dessert Plum, which ripens at the beginning of October.

Late Rivers. Fruit medium or small, round, dark purple, almost black; flesh yellow, of very fine flavour. End of October and beginning of November. A valuable, extremely late variety, raised by Mr. Rivers.

Lawrence's Favourite. Fruit large, round, dull yellowish-green, covered with grey bloom; flesh tender, juicy, and rich. Beginning of September. Dessert. The tree is a free grower and bearer; it forms a beautiful pyramid.

McLaughlin's. Fruit large, yellow, mottled with red, and covered with a thin bloom; flesh firm, sweet, very juicy and rich. Middle and end of August. A large and delicious dessert Plum of the GREEN GAGE race.

Mirabelle. Fruit very small, oval, yellow, covered with a light bloom, and marked with reddish spots next the sun; flesh deep yellow, firm, briskly flavoured. Middle of August. Valuable for preserving and culinary purposes. The tree often bears its fruit in clusters; it forms a beautiful pyramid, and is well adapted for pot culture.

Mitchelson's. Fruit medium-sized, oval, deep purple, almost black, covered with a thin blue bloom. End of August and beginning of September. A fine Plum for cooking and preserving. The tree is a prodigious bearer.

Orleans. Fruit medium, round, dark red or purple when fully ripe; flesh tender, and briskly flavoured. Middle and end of August. An old, well-known, and highly valued culinary sort, excellent for preserving, but only second-rate for dessert. It is an abundant bearer, and does best against a wall. There are also varieties known as the EARLY and LATE ORLEANS, in reference to their season of ripening.

Oullins Golden. Fruit very large, greenish-yellow, dotted with crimson where exposed, and covered with a delicate bloom; flesh very tender, juicy, and delicious. Beginning and middle of August. An excellent and very handsome early dessert Plum. Tree unusually fertile.

Perdrigon Violet Hâtif. Fruit medium, purple, juicy, rich, and excellent. Middle of August. Dessert. Tree very hardy, and bears abundantly.

Pond's Seedling. Fruit very large, oval, bright dark red, with some grey spots, and covered with bluish bloom; flesh juicy and briskly flavoured. Beginning and middle of September. A great bearer, very valuable as a culinary variety.

Prince Engelbert. Fruit very large, oval, deep purple, with a remarkably dense bloom; flesh juicy, with a rich, brisk flavour. End of August, and September. One of the finest culinary Plums, delicious when preserved; it is also good for dessert when highly ripened. The tree is a great bearer.

Prince of Wales. Fruit medium or rather large, round, reddish-purple, with yellow dots and a thick bloom; flesh juicy and sweet. Beginning of September. A good culinary sort. The tree is an abundant bearer.

Purple Gage. Fruit medium, round, purple, with pale blue bloom; flesh firm, and of the most delicious flavour. Beginning and middle of September. A dessert Plum of the greatest excellence; if allowed to ripen and shrivel, the fruit becomes a perfect sweetmeat. Tree hardy and productive; succeeds as a standard, and also against a wall.

Red Magnum Bonum. Fruit very large, oval, deep red; flesh firm, and briskly-flavoured. Middle of September. A very old culinary variety; it succeeds well as a standard.

Reine Claude de Bavay. Fruit large, round, greenish-yellow, mottled with green, and covered with a delicate bloom; flesh tender, rich, and sugary. End of September and beginning of October. Dessert. A large, valuable variety of the GREEN GAGE race.

Royale de Tours. Fruit large, light purple, with small, yellow dots and blue bloom; flesh very juicy, and of rich flavour. Middle of August. Excellent either for dessert or preserving.

Royale Hâtive. Fruit medium-sized, round, light purple, with blue bloom; flesh yellow, melting, exceedingly rich. End of July. A good early dessert Plum.

Sultan (Rivers'). Fruit medium or large, round, deep red, with a thick bloom; flavour brisk and pleasant. Middle of August. A very productive and excellent culinary Plum, raised by Mr. Rivers from BELLE DE SEPTEMBRE.

The Czar (Rivers'). Fruit very large, oval, dark purple, almost black when ripe; flesh tender, juicy, and agreeably flavoured. End of July and beginning of August. A very valuable early culinary Plum, raised by Mr. Rivers from PRINCE ENGELBERT, fertilised by another variety. The tree is hardy, robust, and very productive, and the fruits are not liable to crack with the rain.

Transparent Gage. Fruit large, round, much flattened, greenish-yellow, marbled with red; flesh transparent, rich, juicy, and

Plum—*continued.*

of high excellence. Beginning and middle of September. One of the most delicious Plums for dessert, and considered the finest of the Gage tribe. Two seedlings have been raised by Mr. Rivers from this variety, and named EARLY TRANSPARENT and LATE TRANSPARENT GAGE. The first-named is said to ripen ten days before, and the other ten days after, the typical sort. "The two seedlings and the parent differ entirely in their growth, but are almost identical in the quality and size of the fruit. The EARLY TRANSPARENT is upright and compact, but vigorous; the LATE TRANSPARENT is dwarf and compressed" (Rivers).

Victoria. Fruit large, roundish-oval, bright red, covered with a thin bloom; flesh very juicy and sweet. September. A well-known and first-rate culinary Plum, very extensively cultivated in market gardens, and worthy of a place in every collection. The tree is a most abundant bearer, both as a standard and against a wall.

Washington. Fruit large and handsome, deep yellow when ripe, marked with crimson, and covered with pale bluish bloom; flesh firm, rich, and sugary. Middle of September. One of the best culinary Plums, also sometimes used for dessert.

White Magnum Bonum. Fruit very large, oval, deep yellow, with thin, white bloom; flesh firm, rather coarse, sub-acid. September. A very large and valuable variety for cooking and preserving; it is usually known as the EGG PLUM. The tree is vigorous, and generally bears well.

Winesour. Fruit rather small, oval, dark purple; flesh juicy, sub-acid. Middle of September. A very valuable variety for preserving and for culinary purposes; much esteemed in some districts, but not so good in others.

Woolston Black. Fruit medium, round, deep purple, with blue bloom; flesh melting and richly flavoured, particularly after becoming shrivelled. Beginning of September. Dessert.

Of the Bullace (*Prunus insititia*) there are several varieties. The species grows wild in many parts of Britain, and the fruits are much like Damsons, except that they are round, instead of being oval. They are used for cooking and preserving. The sorts best known are named respectively BLACK, ESSEX, ROYAL, and WHITE. The trees are usually enormous bearers. Amongst Damsons the following are recommended:

Common. Fruit small, roundish-oval, dark purple or nearly black. Middle and end of September. A well-known variety, much esteemed for preserving.

Crittenden's, or Cluster. Fruit larger than other varieties of Damson, roundish-oval, black, with a thin bloom. Middle of September. This is considered the best sort of Damson; it was raised in Kent, and has recently been brought into prominent notice because of its extraordinary fertility. The tree forms a handsome pyramid.

Prune. Fruit oval, larger than the COMMON Damson, and considered better for preserving, but the tree is not generally so productive. September. Much esteemed in the North.

Rivers' Early. A seedling raised by Mr. Rivers from ST. ETIENNE PLUM. Early in August. It is very early, and a valuable addition.

White. Fruit oval, pale yellow, with a thin bloom; flesh yellow, agreeably acid. End of September.

FUNGI. The Fungi parasitic on Plums need not be greatly dilated upon, since few of them do much injury to any part of the tree. A considerable number of *Pyrenomycetes* have been found growing upon the dead branches; but they are not known to be injurious to the living plants, with a few exceptions mentioned below, and even these are scarcely dangerous, except under conditions that specially favour their growth. The leaves are sometimes thinly covered with a white coating, composed of filaments of the nature of those described under **Oidium.** After a time, there become visible, scattered over this coating, small, round, black particles, like grains of gunpowder. These, by the help of the microscope, are seen to be perithecia, in each of which is inclosed a single ascus, and in this lie eight colourless, oblong, very minute spores, which escape by the walls of the perithecium bursting when ripe. The latter body is provided on the top with from three to seven upright, stiff, slender outgrowths, each of which bifurcates four or five times near the tip. This Fungus has received the names *Podosphæra Kunzei*, and *P. tridactyla*. The latter name is now generally adopted. Reproduction is effected both by the spores described above, and by means of conidia, developed as described under **Oidium.**

Plum—*continued.*

Though not uncommon, the Fungus is seldom very hurtful to Plum-trees; but, where desirable to check its growth, this may be effected by dusting the leaves with flowers of sulphur, or by syringing them with a mixture prepared from sulphur and quicklime, as recommended under **Mildew,** or with potassium sulphide solution (*see* **Oidium**).

Another Fungus parasitic on Plums, and named *Exoascus Pruni*, gives rise to a peculiar condition of the fruit, known as "Bladder Plums." The presence of this Fungus is easily recognised by the great increase in the size of the young fruits, as compared with healthy fruits of the same age, by their elongated, pointed form, by the greyish-green bloom on their surface, and by the diseased fruits being hollow, like bladders, with frequently barely a vestige of the seed. After a short time, these enlarged fruits turn to a dirty-yellow colour, fade, and shrivel up. The mycelium of this Fungus lives all the year round in the soft bast of the twigs, which often show distinct traces of its presence. From these it extends into the ovaries of the flowers, along the woody bundles, and thence spreads throughout the tissues, and comes to lie close below the skin of the ovary. Branches grow out from the mycelium, burst through the skin, and stand erect, side by side, over the surface. Each reaches a length of rather over $\frac{1}{250}$in., with a breadth of about a quarter as much, and is supported on an oblong stalk-cell, about one-fourth of its length, which rests on the surface of the epidermis, not pressing between its cells. Each of the longer cells is an ascus, and has inclosed in it eight round spores, which are set free by the bursting of the ascus, about the time the fruit withers. The spores are scattered far and wide by the wind, and such as fall into favourable situations propagate the disease anew. The only remedy likely to prove useful is to cut off, and burn without delay, the fruits and branches that show traces of the Fungus.

The leaves of Plum-trees frequently show thickened, fleshy, orange-red spots, of irregularly-rounded outline, These are the work of a Fungus known as *Polystigma rubrum.* A section through one of these spots will probably pass through one or more flask-shaped spaces, some of which are perithecia, inclosing numerous asci, in each of which are eight minute, oval, colourless spores. Other of the flask-shaped bodies are pycnidia of the same Fungus; and in them lie numerous slender, curved, rod-like, colourless sporidia, each formed on the tip of a small stalk. Both kinds of flasks have the walls inseparable from the surrounding tissues, and both open by narrow mouths on the lower surface of the spots. On examination, with the microscope, of a thin slice from the leaf, the tissues are found crammed with the filaments of the Fungus, and much altered. However, the spots are rarely so numerous as to do much harm to the leaves, though they take nourishment from them, and prevent the proper fulfilment of their functions. This Fungus is widely spread, in Europe, Asia, and North America. Where the Fungus is doing harm to Plum-trees, it will be well to collect and burn the diseased leaves, and also those which have fallen. Sorauer recommends digging the latter into the ground in early spring, before the young leaves burst from the buds, to prevent risk of their being infected. As regards the prevention of diseases of Plum-trees, it is very desirable to remove from their neighbourhood Sloe-bushes and Bird Cherries, since the disease-producing insects and Fungi live on these species as well as on the Plum.

Plums frequently suffer badly from the action of *Oidium fructigenum*, for a full account of which, including remedies, *see* **Pear** (FUNGI). The Fungus sometimes covers the entire surface of the fruits, rendering them quite white, and causing them to dry up.

INSECT PESTS. These are not very hurtful in the

Plum—*continued.*

British Islands except, it may be, in a few cases, under peculiar conditions. The roots are liable to be cut and eaten by Cockchafers, &c. Certain Bark Beetles injure the stems, especially of trees that are not otherwise quite healthy. Some Weevils also feed, as larvæ, in winding galleries below the bark of diseased or weakly trees; among these, one of the more prominent is *Magdalinus Pruni*, a beetle about $\frac{1}{12}$in. to $\frac{1}{8}$in. long, with black body and dull red antennæ.

The branches are attacked at times by Weevils of the genus *Rhynchites*. *R. Alliariæ*, which is perhaps the most injurious species, is from $\frac{1}{8}$in. to $\frac{1}{6}$in. long, and is blue, with coarsely-striated wing-cases, dusky antennæ, and a moderately long beak. The female lays her eggs on the buds near the end of the young shoots, in spring, and then gnaws the branch a little below the tip. The part beyond the notch hangs down and withers, and is thereby rendered suitable for nourishing the larvæ, which usually feed in the pith. This Weevil is at times very hurtful among young trees on the Continent. The perfect insects of this, and of certain allied species, do considerable harm by gnawing the young buds and leaves.

A considerable number of Moths, and one Butterfly, *Aporia Cratægi*, or the Black-veined White (*see* **Hawthorn Caterpillars**), feed, as larvæ, upon Plum leaves; but most of those that call for notice are more hurtful to other trees, and will be found treated of under the following headings: **Lackey Moth, Leaf-rollers, Liparis, Moths, Tortricina,** and **Winter Moths.** The larvæ of certain species of Sawflies also prove destructive by devouring the leaves. The worst of these is *Eriocampa limacina*, the larvæ of which feed on a great variety of cultivated trees and shrubs, and go by the name of Slugworms, because of their form, of their sluggish habits, and of a slimy excretion that covers the body. For an account of these larvæ, and of the means to be used to destroy them, *see* **Slugworms.** The young branches and leaves are invaded, at times, by colonies of Aphides or Green Flies. *Phorodon Humuli*, var. *Mahaleb*, causes the young leaves at the tips of the twigs to become rather fleshy and wrinkled, the insects living in large colonies on their lower surface. *Myzus Persicæ* has very similar habits; and one or two other species are not rare on Plum-trees.

The flowers and fruits are attacked chiefly by the Plum Weevil (*Rhynchites cupreus*) and the Plum Tortrix (*Carpocapsa funebrana*). The larvæ of both these insects bore into the unripe fruit, and, by causing its premature fall, materially injure the crop. The Weevil is rather under $\frac{1}{3}$in. long, bronze or coppery in colour, with a thin coating of scattered grey hairs, and a black beak and limbs. The wing-cases are deeply marked with dots or pittings. When the fruit is scarcely half grown, the female lays her eggs on it, and the larvæ penetrate into it. The moth (*Carpocapsa funebrana*) is seldom seen, but it is very common, in the larval state, in unripe Plums. The fore wings are grey, clouded with darker shades; at the hinder angle of each is a spot of ash-grey, with a faint metallic lustre, surrounded by an indistinct border, in which lies a row of black dots. The spread of wings is rather over $\frac{1}{2}$in. The larvæ are reddish above, paler below, with the head brown-black. There are a few soft hairs on the body. The larvæ of both beetle and moth feed in the Plums during early autumn, and, when the fruits fall, the larvæ crawl out, burrow into the ground, and there become pupæ, to emerge as perfect insects in the following spring.

Remedies. For the means to be adopted against insects on the roots, *see* **Cockchafer** and **Mole Cricket**; and for those against Bark Beetles, *see* **Scolytidæ.** The leaf-feeding beetles and larvæ of moths are best got rid of by shaking or jarring the branches over anything laid or held below, and collecting and killing the insects. In some cases, hand-picking is the most satisfactory method The Slugworms or Sawfly larvæ cannot be got rid of by this method, but require special treatment, for which *see* **Slugworms.** Aphides are best combated by the removal of all surplus young twigs, especially if attacked by the Aphides, and by applications syringed upwards below the leaves. *See* **Aphides.** The species that feed in the fruits are best kept under by collecting the prematurely fallen fruits, without delay, and burning them, or giving them to pigs.

Plum—*continued.*

Following up the above account of the insect pests on the Plum, it may be mentioned that Mite Galls, of the genus *Phytoptus* (*see* **Mites**), produce galls of two or three kinds on the leaves of the Plum, as well as on the Sloe and the Bird Cherry. Of these, the more conspicuous are *Erineum Padi*, in the form of irregular patches of velvety, close-set hairs, at first pale, but becoming rusty-brown, on the lower surface of the leaf; also outgrowths of a rounded or bullet-like form, and half a line to two lines long, and green or red, scattered over the surface of the leaf (*Cephaloneon molle*), or near the margins (*C. hypocrateriforme* and *C. confluens*). They also, at times, produce small galls in the bark of young branches (*Cecidoptes Pruni*). However, none of these mite-galls seriously affect the welfare of the tree, though rendering it unsightly. If from any cause it seems desirable to check the increase of the galls, hand-picking is the only remedy likely to be of use.

The fruits of the Plum-tree are very much injured, in the United States of America and in Canada, by the larvæ of two kinds of Weevils, both living in the fruit. Though neither has proved hurtful to Plums in England, the habits of the larvæ, and their abode in the fruits, render their introduction not unlikely; hence, the insects and the kind of injury done by them, are here shortly described. The Plum Curculio (*Conotrachelus nenuphar*) is about $\frac{1}{4}$in. long, small, rough, and blackish, and has on each wing-case, in the middle, a black, shining hump, and behind this a clay-yellow band, variegated with white spots in the middle. The female settles on the young fruit, bores a hole in the skin to receive an egg, drops it in, and then makes a crescent-shaped cut about half round it. She repeats this process on one fruit after another. The larva hatches in a few days, and at once eats into the fruit, till it arrives at the stone, near which it feeds. It reaches its full size in from three to five weeks. The fruit becomes gummy, and falls prematurely and the larva remains, till it is full grown, in the fallen fruit; it then eats its way out, bores into the ground, changes into a pupa, and the perfect insect emerges in from three to six weeks. The beetles hybernate under bark and in other retreats. This insect often destroys a large part of the Plum and Cherry harvest, and it also feeds in other stone fruits. The best remedy is to jar the beetles into an inverted umbrella, or on to sheets spread below the tree, and to collect and destroy the fallen fruits without delay, or to turn pigs into the orchards to feed on them. Rubbish should not be left for shelter to beetles. The second species (*Coccotorus scutellaris*) is popularly called the Plum Gouger. It is very common in the valley of the Mississippi, but has not yet been found in the Eastern States. It is said to be less hurtful than the former species, which is fortunate, as its habits render it the more likely to be brought to Europe. In general appearance, it is somewhat like the Plum Curculio, but differs as follows: It is nearly $\frac{1}{3}$in. long; the head and wing-cases are brown, with a leaden-grey tint; and the wing-cases are variegated irregularly with black and pale spots, and bear no humps; the thorax and legs are ochre-yellow; and the snout cannot be folded below the breast. The beetles appear in spring. The female bores holes in the young Plums, and pushes an egg into each, but she makes no cuts around them. The larva hatches in a few days, and bores at once to the stone,

Plum—*continued.*

which it pierces while still soft. The larva feeds, till full grown, on the seed, and then bores a hole for its escape as a beetle; but it remains inside the stone, and there becomes a pupa. The beetle emerges usually in August or September, and hybernates in the perfect state. It feeds, in spring, on young Plums, into which it bores its beak. The Plums exude gum, and become knotty and useless. This beetle is also known as *Anthonomus prunicida*. The remedies recommended are jarring the trees, to shake down the beetles, as with the Plum Curculio, and collecting and destroying fallen fruits. The beetles are active, and take flight readily; hence, jarring is less successful than with the former species.

PLUMBAGELLA. Included under **Plumbago** (which *see*).

PLUMBAGINEÆ. A natural order of herbaceous or woody, generally perennial plants, broadly distributed, but, for the most part, abounding in maritime districts and salt lands. Flowers pink, violet, blue, or yellow, rarely white, hermaphrodite, regular, sessile or shortly pedicellate; calyx gamosepalous, tubular or funnel-shaped, sometimes coloured, five, ten, or fifteen-ribbed, the primary ribs produced into teeth or lobes; corolla monopetalous, or of five petals, hypogynous, sometimes shortly connate or coherent, rarely all free at base; stamens five, opposite the petals or corolla lobes. Fruit a capsule or utricle, included in the calyx, or rarely elongated and exserted. Leaves sometimes fascicled at the top of a rhizome, simple, entire, semi-amplexicaul; sometimes shortened into a petiole, dilated at its base, and amplexicaul; sometimes alternate, on a branching stem, with swollen nodes; exstipulate. Certain of the species possess tonic and astringent properties. The Plumbagos contain a caustic colouring matter. Eight genera and scarcely 200 (according to Bentham and Hooker) species are included in this order. Examples are: *Armeria*, *Plumbago*, and *Statice*.

PLUMBAGO (the old Latin name, used by Pliny, from *plumbum*, lead; the plant is said by him to be efficacious in curing the *lead* disease). Leadwort. SYN. *Thela*. Including *Plumbagella*. ORD. *Plumbagineæ*. A genus comprising about half-a-score species of stove, greenhouse, or hardy perennial herbs, sometimes shrubby, rarely annuals (one species leafless), inhabiting the warmer regions of the globe. Flowers blue, rose-colour, violet, or white, spicate at the apices of the branches; calyx tubular, five-fid; corolla salver-shaped, the limb spreading, five-lobed. Leaves usually alternate, auriculate-amplexicaul, or dilated at base into an amplexicaul petiole, or naked and toothed. The tender sorts flower best in a moderately warm house, and are well adapted for growing against a wall. The most suitable compost is one of good fibrous loam and sand, and a little peat. They do very well when planted out in the borders of a warm conservatory, or in a warm greenhouse. Propagated by the rooted shoots from the base of the plants; or by nearly ripe cuttings, which root freely in a gentle bottom heat. The annual species are easily raised from seeds, sown in the open border, in spring. The majority of the species are, or have been, cultivated in our gardens. *P. capensis* is admirably adapted for training up a greenhouse rafter or pillar. It should be cut back hard after flowering, and allowed to rest through the winter by being kept rather dry. The beautiful pale blue flowers are produced in the greatest profusion on the shoots of the current year. This plant also succeeds in a warmer temperature, and, if grown in two or three positions differently affected in this respect, the flowering season collectively may be prolonged by the plants in one house succeeding those in the other. *P. rosea* is a fine winter-flowering plant, requiring more heat than *P. capensis*,

Plumbago—*continued.*

except in the summer. It is adapted for pot culture, or for planting in a stove. The hardy perennial species thrive in ordinary soil, and may be increased by divisions.

P. capensis (Cape of Good Hope).* *fl.* pale blue, disposed in terminal, sub-secund, short, approximating spikes; corolla tube thrice as long as the calyx. Summer and autumn. *l.* oblong or oblong-spathulate, obtuse, mucro-nulate, entire. Stem angularly striate. *h.* 2ft. Cape of Good Hope, 1818. A stove or greenhouse, climbing or decumbent shrub, sometimes employed in bedding. (B. M. 2110; B. R. 417.)

P. cœrulea (blue). *fl.* blue, about ½in. long, disposed in loose, terminal spikes; corolla half as long again as the calyx tube, dilated above. Summer. *l.* ovate-oblong, sub-rhomboid, attenuated and slightly acute at both ends. Stem erect, flexuous, branched. *h.* 1½ft. South America, 1826. Greenhouse annual. (B. M. 2917, under name of *P. rhomboidea*.)

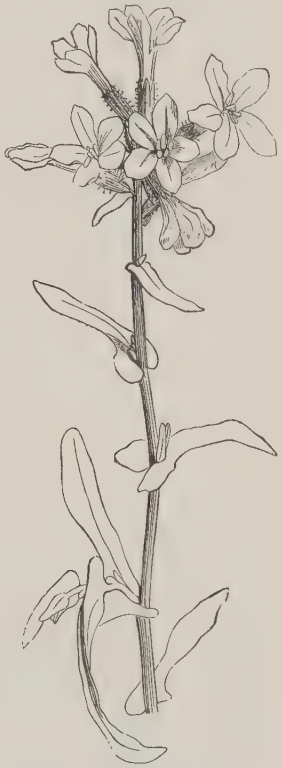


FIG. 206. INFLORESCENCE OF PLUMBAGO EUROPÆA.

P. europæa (European). *fl.* violet-rose, spicate and somewhat headed at the tips of the branches; corolla tube nearly twice as long as the calyx, enlarged above. September. *l.* slightly powdery beneath, slightly gland-toothed at the margin; lowest ones shortly attenuated or sessile; intermediate ones ovate or oblong; uppermost ones lanceolate or linear, acute. Stem erect, much branched. *h.* 3ft. South Europe, 1596. Hardy herbaceous perennial. See Fig. 206. (B. M. 2139; S. F. G. 191.)

P. Larpentæ (Lady Larpent's).* *fl.* violet, in close, terminal heads; sepals and bracts shining, ciliated, destitute of glands. October. *l.* obovate, acute, tapering to the base, minutely scaly, finely serrated, fringed. Stems slender, zigzag, scaly, hairy. *h.* 1ft. Shanghai, 1846. Hardy perennial. (G. C. 1847, 732.) The correct name of this plant is *Ceratostigma plumbaginoides*.

P. micrantha (small-flowered). *fl.* white, disposed in terminal or axillary, shortly pedunculate spikes. July. *l.*, lower ones oblong, slightly toothed, attenuated into very short, amplexicaul petioles; the rest sessile, oblong-lanceolate, acuminate, cordate-auriculate at the base. Stem angular-sulcate, erect, or diffuse and much branched. *h.* 2ft. Siberia, &c., 1829. Hardy annual.

P. occidentalis (Western). A synonym of *P. scandens*.

P. pulchella (pretty). *fl.* bluish-violet, scarcely ½in. long, disposed in loose, terminal, elongated spikes; corolla tube scarcely half as long again as calyx. Summer. *l.* ovate-oblong, acuminate, attenuated at base into very short, amplexicaul petioles. Stem slender, erect, branched, striated. *h.* 2ft. to 3ft. Mexico. Stove sub-shrub. (L. B. C. 1536, under name of *P. rhomboidea*.)

Z

Plumbago—*continued.*

P. rosea (rose).* *fl.* rosy-scarlet, 1½in. to 2in. long, axillary or disposed in long, terminal spikes; calyx slightly-reddish; corolla tube slender, four times as long as the calyx. July. *l.* large, oblong, attenuated and slightly obtuse above, shortly cuneate at base, and attenuated into very short, amplexicaul, exauriculate petioles. Stem erect, terete, slender, striated, simple beneath, branched above. *h.* 2ft. East Indies, 1777. Stove perennial. (B. M. 230.) *coccinea* is a splendid variety, with larger, more brightly-coloured flowers. (B. M. 5363.)

P. scandens (climbing). Devil's Herb; Toothwort. *fl.* white, disposed in loose, terminal, elongated spikes; corolla tube twice as long as the calyx. July. *l.* oblong or oblong-lanceolate, acuminate, on short petioles, amplexicaul at base. Stem somewhat climbing, slender, striated, much branched. *h.* 3ft. West Indies, 1699. Stove shrub. SYN. *P. occidentalis.*

P. zeylanica (Cingalese). *fl.* white, disposed in elongated, rather dense spikes; corolla tube twice as long as the calyx. June. *l.* ovate or oblong, slightly acute, very shortly and abruptly attenuated into an amplexicaul, short petiole. Stem somewhat climbing, angular-striate, much branched. *h.* 1½ft. East Indies, 1731. Stove shrub. (B. R. 1846, 23.)

PLUM, CHERRY. *See* **Prunus cerasifera.**

PLUM, COCOA. *See* **Chrysobalanus Icaco.**

PLUM CURCULIO. *See* remarks on INSECTS under **Plum.**

PLUM, DATE. *See* **Diospyros.**

PLUMERIA (named in honour of Charles Plumier, 1646-1706, a French traveller and writer on botany). SYN. *Himatanthus.* ORD. *Apocynaceæ.* A rather large genus (about forty species have been described) of glabrous or pubescent stove trees, with thickish branches, natives of tropical America. Flowers white, yellowish, or rose-purple, large, in terminal cymes. Leaves alternate, often on long petioles, penniveined. The species thrive best in a compost of sandy loam and fibry peat. Propagated, in spring, by cuttings of ripe shoots, inserted in sand, under a handlight. Very few species are now in cultivation.

FIG. 207. FLOWERING BRANCHLET OF PLUMERIA TRICOLOR.

P. acuminata (acuminate). A synonym of *P. acutifolia.*

P. acutifolia (pointed-leaved).* *fl.* pink outside and white within, very fragrant, in compound, spreading cymes. June to September. *l.* scattered, lanceolate, acuminated, glabrous, flat. *h.* 20ft. Naturalised in India, &c., 1790. (B. M. 3952; B. R. 114.) SYN. *P. acuminata.*

P. bicolor (two-coloured). *fl.* white, with a yellow throat, a very long, thick, incurved tube, and obovate-oblong, oblique segments; peduncles thickened at top, corymbose. July. *l.* lanceolate-oblong, with revolute edges, acuminated, 1ft. long. *h.* 15ft. West Indies, 1733. (B. R. 480.)

P. Jamesoni (Jameson's). *fl.*, corolla large, hypocrateriform; tube long, yellow, deeply tinged with red; limb of five rich yellow segments; peduncles terminal, 9in. to 12in. long; pedicels red. July. *l.* mostly confined to the tips of the branches, large, broadly-oblong, on rather long, nearly terete petioles (furrowed on the upper side), attenuated at base, acuminated at the extremity. *h.* 4ft. Guayaquil. (B. M. 4751.)

Plumeria—*continued.*

P. Kerii (Ker's). A synonym of *P. tricolor.*

P. Lambertiana (Lambert's). *fl.* white, with a yellow throat, and broad-rhomboid, obtuse segments. May to August. *l.* oblong, acuminated, flat. *h.* 10ft. Mexico, 1824. This differs from *P. tricolor* in having larger, inodorous flowers, and in the segments being broader and rounder. (B. R. 1378.)

P. lutea (yellow-flowered).* *fl.* very sweet-scented; corolla 4in. in diameter; lobes very pale pink, with a broad, pale golden-yellow base; tube hairy within; cymes terminal, sub-umbellate, about as long as the leaves. June. *l.* crowded at the ends of the branches, spreading, 8in. to 18in. long, narrowly oblong-obovate, tapering into the stout petiole, sub-acute. Branches and branchlets stout, scarred. *h.* 10ft. to 20ft. Peru, 1869. (B. M. 5779.)

P. rubra (red).* Frangipani-plant. *fl.* red, crowded in fascicles, with a pilose throat, and obliquely obovate-oblong segments, which are rounded at the apex; peduncles elongated. July. *l.* obovate-oblong, acute, with flat edges. *h.* 12ft. to 20ft. Jamaica, 1690. (B. M. 279; B. R. 780.)

P. tricolor (three-coloured). *fl.*, corolla with a yellow throat, white above the yellow part, and red round the margins of the segments; peduncles terminal, cymose. July to October. *l.* obovate-oblong, tapering at both ends, entire. *h.* 15ft. 1815. See Fig. 207. (B. R. 510.) SYN. *P. Kerii.*

P. tuberculata (warty-stemmed). *fl.* white, scentless; peduncles axillary, much shorter than the leaves, many-flowered. August. *l.* coriaceous, narrow-oblong, obtuse, tapering a little way into the petioles, downy beneath. Branches tuberculate. *h.* 6ft. St. Domingo, 1812. (L. B. C. 681.)

PLUM, GINGERBREAD. *See* **Parinarium macrophyllum.**

PLUM, MAIDEN. *See* **Comocladia.**

PLUMOSE. Feathery, as the pappus of Thistles.

PLUM SLUG. *See* **Slugworms.**

PLUM TORTRIX. *See* **Plum** (INSECTS).

PLUM WEEVILS. *See* **Plum** (INSECTS).

PLURI. Used in composition, this term signifies many or several, *e.g.*, Plurilocular, many-celled.

PLURIDENS. A synonym of *Bidens.*

PLUSIA. A genus of *Noctuidæ*, the larvæ of some of which do considerable injury to cultivated plants. The British species vary between 1¼in. and 1¾in. in spread of wings, and they almost all possess shining metallic, silvery, or golden spots and markings on the rather pointed front wings. The thorax and abdomen bear crests of hair-like scales. The moths generally fly during the day; when at rest, the wings are held like a roof over the hinder part of the body. The larvæ are rather slender, tapering markedly towards the head, which is small; they have six true legs in front, but only six prolegs, being the last three pairs of the five usually present in larvæ of *Noctuæ.* Owing to the absence of the front prolegs, they "loop" in walking, like Geometer larvæ. When full-fed, they spin loose cocoons among dead leaves, or on the food-plants, and in these become black pupæ. Two, or even more, broods may be hatched in a year.

The larvæ of several species feed on Groundsel, Nettles, and other low weeds, and may at times devour cultivated plants along with these; but the only species that is really dangerous to garden and field produce is *P. Gamma*, the too well-known Silver Y, or Gamma Moth. The larva of the moth is, indeed, one of the worst pests at times, alike in the garden and in the field. The moths may be seen, from June to the end of October in some years, flying in the bright sunshine, and not less in the twilight; nor do they cease to fly even at night. Frequently, they swarm in myriads in hay-fields, among Turnips, in gardens, and, in fact, everywhere. Some idea of the form, size, and markings, may be obtained from Fig. 208, in which, however, the characteristic silvery mark on the front wings, like the Greek letter *gamma* (γ), or the letter *y*, is not well shown. It is plainest in the left wing near the middle. The front wings are grey or violet-grey, marbled with warm brown, which is darkest in a lozenge-shaped patch on the inner margin; in this patch lies

Plusia—*continued.*

the silvery *y*. The hind wings have a broad, dark band along the margin, and the basal space is pale grey. The eggs are laid on the lower surface of the leaves. The larvæ are thickest at the twelfth segment, tapering forwards. They are bright green, with bluish-green dorsal line, bordered along each side with a white line; and there are four more narrow white lines and a yellow line on each side, near the spiracles or breathing pores. There are a good many scattered, fine bristles on the body. The larvæ rest with the back arched, and move by looping. They feed upon all kinds of herbs, including

FIG. 208. PLUSIA GAMMA.

Nettles and other weeds, as well as upon many low cultivated plants, such as Cabbages, Beets, Peas, Beans, &c. The best methods of effectively lessening their numbers are to destroy the larvæ, either by hand-picking, or by sweeping them, or beating them, off their food, and destroying them at once; or ducks and hens may be turned in to feed on them. Dusting the plants with soot or caustic lime is also recommended, though not very safe for delicate plants. Among the points to be specially attended to is the removal of weeds from gardens and field crops alike, as they afford shelter for the insects.

PLUTELLA CRUCIFERARUM. A small moth, known also as the Diamond-back or Turnip-moth, belonging to the group of *Tineina*. It is excessively common throughout Great Britain; and, despite its small size, the ravages committed by the larvæ in some years are sufficient to force it on the notice of every observant farmer and gardener. The wings are about ⅝in. across. They are narrow, with long fringes, and are of a greyish-brown colour, with darker spots, the inner margin bearing a long, pale ochreous streak, with three prolongations into the dark part. While at rest, the moths sit in a very characteristic attitude, with the antennæ held straight forward, and nearly touching their support, and the wings folded over the body, like the sloping sides of a roof. The pale edges are thus in contact, and resemble a row of three diamond-shaped spots. The legs are nearly hidden by the wings in the sitting insect. The larvæ are pale green in colour, with a darker head, several black dots on the next segment, and two yellowish spots on each of the next two segments. They have a few bristly hairs on the body, which tapers a little towards each end. They feed on the lower surface of the leaves of Turnip, Cabbage, and other *Cruciferæ*, eating away the substance of the leaf between the veins. Frequently, a dozen or more may be found on a leaf, and, when very numerous, or while the plants are small, the crop is apt to suffer severely. When full-fed, the larvæ spin slight cocoons in the hollows between the leaf-veins on the lower surface, or on the soil, among rubbish, and change into pale brown pupæ, marked with black lines on the back and wing-cases. The moths emerge in from two to three weeks. There are two chief broods in the year, the moths appearing in May and August, and the larvæ about a month or six weeks later.

Remedies. These are very difficult of application, since the larvæ live protected by the leaves from the direct application of insecticides, while their numbers and small

Plutella Cruciferarum—*continued.*

size render hand-picking slow, and unlikely to be successful, except on a small scale. The removal and destruction of leaves, with numerous larvæ and pupæ on them, and also of surface rubbish in autumn, lessens the risk to future crops. Brushing below the plants with branches of Firs, or of other twiggy shrubs or trees, has been recommended as likely to remove a number of the larvæ. Whatever favours rapid growth in the plants, *e.g.*, manures and watering the plants in dry weather, will be of service; and gas lime and soot, thrown below the plants, might assist in keeping away the moths during the time of egg-laying, and in reducing the injury to the leaves.

PNEUMONANTHE. Included under *Gentiana*.

POA (from *poa*, an ancient Greek name for grass or fodder). Meadow Grass. ORD. *Gramineæ*. A large genus (about eighty species) of hardy, sometimes dwarf annual, sometimes taller and perennial, grasses, broadly dispersed, but mostly found in North temperate regions. Inflorescence either in spreading or close panicles, the spikelets, for the most part, several-flowered and awnless; outer glumes unequal, and generally keeled; upper pales shorter and narrower, with inflexed, membranous margins. Few of the species are grown in gardens, being mostly of agricultural value. Eight are British plants. The following are probably as much worth growing as any. They are of very easy culture in ordinary garden soil. Propagated by seeds, or by divisions.

P. fertilis (fertile). A synonym of *P. palustris*.

P. palustris (marsh-loving). *fl.*, inflorescence in airy, diffuse, purplish or violet-tinged panicles, rising to a height of from 2½ft. to 3ft. *l.* long, soft, smooth, slender, arching, and forming dense tufts. Southern Europe, &c. A very desirable species, and one of the best for forming dense, isolated tufts, near the banks of streams. SYN. *P. fertilis*.

P. trivialis albo-vittata (common white-striped).* A very elegant, dwarf, perennial grass, forming dense tufts of erect leaves, which are flat, and broadly margined with pure white. Though a variety of a hardy species, it is most effective, and proves, in respect to its foliage, to be a very useful decorative plant, when grown in pots, under glass. *h.* 6in. 1868. (F. d. S. 1695.)

POARCHON. A synonym of **Trimezia** (which *see*).

POCOCKIA. Included under **Trigonella** (which *see*).

POCULIFORM. Resembling a drinking-cup or goblet in shape.

POD. A several-seeded, dehiscent, dry fruit. The

FIG. 209. THREE-VALVED POD OF YUCCA.

term is more usually applied to a Legume or Siliqua. A three-valved Pod of Yucca is shown at Fig. 209.

PODALYRIA (Podalyrius, in heathen mythology, was the son of Æsculapius). ORD. *Leguminosæ*. A genus comprising seventeen species of greenhouse, evergreen shrubs, more or less silky or silvery-pubescent, natives of South Africa. Flowers one or two, rarely three or four, on axillary peduncles; calyx widely campanulate, remarkably indented at its insertion on the stalk; vexillum suborbiculate, emarginate. Pods ovoid or oblong, turgid. Leaves simple, alternate, continuous with the petioles; stipules subulate, often deciduous. The species, which are rarely seen in cultivation, require a well-drained compost of sandy loam and fibry peat. Propagated, in spring, by cuttings of stubby side-shoots, inserted in sand, under a bell glass.

P. argentea (silvery). *fl.* white; calyx three-toothed, subbilabiate, rusty-tomentose; standard large, obcordate, longer than the clawed, axe-shaped wings; keel shorter than the wings. June. *l.* oval, sharp at both ends, with rust-coloured margins. *h.* 6ft. 1789. SYN. *P. biflora* (B. M. 753).

P. biflora (two-flowered). A synonym of *P. argentea*.

P. buxifolia (Box-leaved). *fl.* purple, with paler wings; pedicels one-flowered, about the length of the leaves. May to July. *l.* oval or oblong, bluntish, glabrous above, silky beneath. *h.* 2ft. to 4ft. 1790. (B. R. 869.)

P. calyptrata (covered).* *fl.* pale purple; pedicels one-flowered, about equal in length to the leaves. May to July. *l.* oval or obovate, mucronate, pubescent, reticulated beneath. *h.* 6ft. 1792. (B. M. 1580.) SYN. *P. styracifolia*.

P. sericea (silky). African Satin-bush. *fl.* pale purple; pedicels one-flowered, much shorter than the leaves, and, as well as the calyces, clothed with appressed, silky pubescence. January to October. *l.* oblong-ovate, mucronate, silky on both surfaces. *h.* 4ft. to 6ft. 1778. (B. M. 1923.)

P. styracifolia (Styrax-leaved). A synonym of *P. calyptrata*.

PODANTHES (from *pous, podos*, a foot, and *anthos*, a flower; alluding to the flowers being borne on long pedicels). SYN. *Obesia*. ORD. *Asclepiadeæ*. A genus comprising about eight species of stove shrubs, allied to *Stapelia*, confined to South Africa. Flowers rather large, solitary, twin or rarely sub-fasciculate; calyx with five acute segments; corolla pale or spotted above, broadly campanulate or at length rotate, the lobes valvate. Stems low, leafless, thick-fleshy, deeply sub-quadrangular; angles decussate and deeply few-toothed. The best-known species are those described below. For culture, *see* **Stapelia.**

P. geminata (twin).* *fl.* usually twin; corolla orange-yellow, dotted with blood-colour; segments lanceolate, acuminate, hairy inside, the margins revolute; outer corona five-lobed. May to November. Joints of branches proliferous, creeping, sub-oval, obscurely tetragonal, floriferous at the tops. 1795. Plant creeping. (B. M. 1326 and L. B. C. 300, under name of *Stapelia geminata*.) The correct name of this plant is *Piaranthus geminatus*.

P. irrorata (bedewed). *fl.*, corolla sulphur-coloured and spotted with blood-colour, more semi-quinquefid than in *P. pulchra*, the bottom blood-coloured; segments tipped with purple, lanceolate, acuminated; pedicels usually solitary. July to September. Branches numerous, erectish, decumbent. 1795. (L. B. C. 127, under name of *Stapelia irrorata*.)

P. pulchra (fair). *fl.* on long, bent pedicels, twin, semi-quinquefid, corrugated; segments of corolla green outside and sulphur-coloured inside, deltoid, acuminated, with numerous dark brown warts; bottom of corolla dark brown, girded by a few glandular hairs. 1800. Plant weak and much branched, creeping.

P. p. verrucosa (warted). *fl.*, corolla pale yellow, with dark purple marks; segments of the outer corona emarginate; the inner one of ovate, yellow corpuscles. Branches longer and thicker than in the type. (B. M. 786, under name of *Stapelia verrucosa*.)

PODANTHUS (from *pous, podos*, a foot, and *anthos*, a flower; in allusion to the stalked flowers). SYN. *Euxenia*. ORD. *Compositæ*. A genus consisting of only two species (closely related) of greenhouse or hardy, much-branched, scabrous-puberulous, resinous shrubs, natives of Chili. Flower-heads yellow, small, dioecious, at length globose, at the tips of the branches or in the upper axils, shortly pedunculate; achenes slightly scabrous-pilose or papillose; involucre small, with few,

Podanthus—*continued.*

narrow bracts; receptacle convex. Leaves opposite, entire or toothed. The species thrive in a compost of peat and loam. Propagation may be effected by cuttings, inserted in sand, under a glass.

P. Mitiqui (Mitiqui). *l.* oval-lanceolate, long-cuneate at base, acuminate at apex, deeply serrate. *h.* 3ft. 1824. Greenhouse.

P. ovatifolius (ovate-leaved). *l.* broadly ovate, not decurrent into the petiole. *h.* 2ft. 1825. Greenhouse. SYN. *Euxenia grata*.

PODIUM, PODUS. Used in Greek compounds, these signify a stalk, stipe, &c.; *e.g.*, Podocephalus, stalked-headed; Leptopodus, slender-stalked.

PODOCALLIS. A synonym of **Massonia** (which *see*).

PODOCARPUS (from *pous, podos*, a foot, and *karpos*, a fruit; the fruits are footstalked). Including *Nageia*. ORD. *Coniferæ*. Of this genus, upwards of sixty species have been enumerated; but, according to the authors of the "Genera Plantarum," less than forty are entitled to specific rank. They are stove, greenhouse, or half-hardy, evergreen trees, rarely shrubs, frequently found in Southern extra-tropical regions, and in tropical mountainous and Eastern Asia; a few inhabiting the mountainous parts of tropical America. The species are absent in Europe, Western Asia, North Africa, and North America. Flowers monœcious or dioecious, axillary or sub-terminal; males solitary, or two to five in a whorl, or many at the sides of a loose, elongated, spicate rachis; females solitary or rarely twin. Fruit drupaceous or nut-like, rarely exceeding ½in. in diameter, often shortly stipitate above the receptacle. Leaves variable. The species thrive in any well-drained, friable loam, and are readily propagated by means of cuttings of the nearly ripened young shoots, inserted in sandy soil, under a bell glass, in a close house or frame, and shaded, during bright sunshine, until rooted. The under-mentioned are the species best known to cultivation. Except where otherwise stated, they are trees, and require greenhouse treatment.

P. andina (Andes).* Plum Fir. *fr.* resembling in form and size the berry of an ordinary White Grape, but in structure that of a Cherry, the kernel being contained in a hard stone, or nut, surrounded by a soft, fleshy pulp, inclosed in a tough rind; when ripe, the fruit has an agreeable flavour. *l.* linear, flattened, ½in. to ¾in. long, sub-distichous, deep green above, and slightly glaucous beneath. *h.* 40ft. to 50ft. Valdivia, Chili, 1860. Hardy. The trunk is well furnished with branches, the lower ones drooping, often sweeping the ground. SYN. *Prumnopitys elegans*.

P. Bidwilli (Bidwill's). A synonym of *P. Totara*.

P. chinensis (Chinese). Chinese Yew-tree. *fl.*, males numerous, axillary; females on lateral footstalks. *fr.* cylindrical-oblong, globular when old. *l.* linear-lanceolate, reflexed on the margins, closely placed, alternate, somewhat two-rowed, 1¾in. to 3in. long, two to three lines wide, the elongated rib terminating in an obtuse point. Branches erect, spreading, alternate or opposite, sometimes somewhat vertical. *h.* 20ft. China and Japan, 1838. A large bush or small tree. SYNS. *P. Maki, Taxus Makoya*.

P. coriacea (leathery). *fr.* globose, solitary, axillary, very small. *l.* elliptic-lanceolate, rather thick, leathery, shining, sessile or tapering at the base into a very long footstalk, almost obtusely pointed at apex, 2in. to 3in. long, nearly ½in. broad, with an elevated midrib. Branches spreading, horizontal, alternate or opposite, naked on the greater part of the larger ones. *h.* 40ft. to 50ft. Jamaica, &c.

P. coriacea (leathery), of gardens. A synonym of *Cephalotaxus drupacea*.

P. dacrydioides (Dacrydium-like). *l.* of two forms—of young trees, and on twigs of old, distichous, ¼in. long; those on old branches imbricated. Diameter of trunk 4ft. *h.* 150ft. New Zealand.

P. elongata (elongated). South African Yellow-wood. *fr.*, seeds about the size of a gooseberry, marbled on the outside. *l.* linear or oblong-lanceolate, straight, rarely falcate, attenuated, stiff, rather thick, 1¼in. to 1¾in. long, two lines broad, dark green or glaucous-blue, sessile or regularly tapering to a short footstalk. Branches opposite or in whorls; upper ones ascending, lower ones sometimes deflected. *h.* 30ft. to 70ft. Cape of Good Hope.

P. Endlicheriana (Endlicher's). *l.* alternate, closely arranged on the branches, somewhat two-rowed, straight or slightly falcate, undulated; those on the branchlets almost oval or

Podocarpus—*continued.*

elliptic, with several leaves in a whorl, 4in. to 7in. long, six to eight lines broad. Branches mostly in whorls of three, rarely scattered, ascending, and little divided. India (?). A tall tree.

P. ensifolia (sword-leaved). *l.* thinly scattered along the branchlets, spreading, leathery, straight or somewhat falcate, elongate-lanceolate, blunt at the point, tapering and somewhat twisted at the base, ⅜in. to 1in. long, ⅛in. broad. Tasmania, &c. A small tree.

P. ferruginea (rust-coloured). *fr.* red-purple, ⅜in. long, glaucous. *l.* distichous, linear-acute, falcate, one-nerved, ⅜in. to ⅝in. long, red-brown when dry. Trunk 3ft. in diameter. *h.* 50ft. to 80ft. New Zealand. The wood of this species is brittle and durable, close-grained and reddish.

P. japonica (Japanese). *l.* alternate, flat, linear-lanceolate, elongated, obtuse-pointed, thick, leathery, 4in. to 8in. long, about ½in. wide, with an elevated rib, almost acute on the upper surface, tapering into a long, slender point at the apex, and into a short, stout footstalk at the base. Japan. A small, hardy tree.

P. koraiana (Corean). A synonym of *Cephalotaxus pedunculata fastigiata.*

P. macrophylla (large-leaved). A synonym of *P. neriifolia.*

P. Maki (Maki, native name). A synonym of *P. chinensis.*

P. Nageia (Nageia). *fr.* blackish-purple, solitary, rarely twin, orbicular, about the size of a cherry. *l.* in opposite pairs, but frequently alternate, elliptic or oblong-lanceolate, attenuated at base, and acuminated at the point, 3in. long, rather above 1in. broad. Branches spreading, alternate or opposite, slender, frequently pendent, with leaves in double pairs or threes. *h.* 30ft. to 60ft. China and Japan. A handsome, hardy species, of which there is a variegated form in cultivation. (S. Z. F. J. 135.) SYN. *Nageia japonica.*

P. neriifolia (Oleander-leaved).* *fl.*, male catkins long, axillary and solitary; females on one-flowered peduncles. *l.* alternate, but mostly closely placed, erect or spreading, lanceolate, acute-pointed, often reflected below, 3in. to 6in. long, ½in. to ⅝in. broad. Branches slender, verticillate. Nepaul, &c. A large tree. In Nepaul, the peduncles of the fruit (not the fruit itself) are eaten. (B. M. 4655; F. d. S. 768.) SYN. *P. macrophylla.*

P. nubigena (cloud-born). *fr.* oblong, axillary, short-stalked, edible. *l.* linear-lanceolate, straight or somewhat falcate, rigid, attenuated at base, with a short, stout footstalk, ⅜in. to 1¾in. long, ⅛in. broad. Chili, &c. A large tree.

P. Purdieana (Purdie's). Yacca-wood-tree. *l.* elliptic or oblong-lanceolate, thick, leathery, very smooth, shining above, flat, straight, rarely falcate, slightly recurved at the margins, 3in. to 5in. long, ⅜in. to 1in. broad, regularly tapering into a short, stout footstalk. Branches spreading, horizontal, marked by the scars of fallen leaves. *h.* 100ft. or more. Jamaica.

P. spinulosa (slightly spiny). Illawarra Pine. *l.* alternate or opposite, or in whorls, linear-falcate, spreading in all directions, pungent, smooth, and thick, 1in. to 1¾in. long, one line broad. Branches slender, spreading. Australia. A much-branched, erect shrub.

P. Totara (Totara). Mahogany or Totara Pine. *fr.* solitary or twin, on a swollen peduncle, as large as a cherry. *l.* distichous or not so, very coriaceous, erect, spreading or recurved, straight or falcate, ½in. to 1½in. long, linear, acuminate, pungent. *h.* 60ft. A spreading tree; the wood is red, close-grained, and very durable. SYN. *P. Bidwilli.*

P. vitiensis (Vitian).* *fl.*, male catkins terminal, cylindrical, 1in. to 1½in. long. *fr.* obovate, obtuse, scarcely 1in. long. *l.* 1in. long, ⅛in. broad, ovate-lanceolate, acute. *h.* 60ft. Viti Levu. A handsome tree, with light, glossy green foliage, thickly set in a distichous manner on the symmetrically-arranged branches. (G. C. n. s., xxv. 465.)

PODOLASIA (from *pous, podos*, a foot, and *Lasia*, from which genus it differs in having a long stipe to the spadix). ORD. *Aroideæ* (*Araceæ*). A monotypic genus. The species is a slender, stove perennial, of striking habit, with a short, erect caudex. It requires culture similar to **Arum** (which *see*).

P. stipitata (stipitate). *fl.*, spathe brownish-red, 3½in. to 4in. long, boat-shaped, open at the base; spadix cream-coloured, changing to brownish, shorter than the spathes, rather long-stipitate; peduncle about 1ft. long, incurved or having a few prickles. *l.* sagittate or hastate, with elongated, narrow, acuminate lobes; petioles long and prickly. *h.* 1ft. Borneo, 1882.

PODOLEPIS (from *pous, podos*, a foot, and *lepis*, a scale; referring to the scaly flower-head stalks). SYN. *Scalia.* Including *Panætia* and *Stylolepis.* ORD. *Compositæ.* A genus comprising twelve species of greenhouse or hardy, annual or perennial, Australian herbs. Flower-heads yellow, pink, or purple, heterogamous, terminal, pedunculate or rarely sessile; involucre hemispherical or rarely ovoid; receptacle flat, without scales; ray florets few or numerous, in a single row. Leaves alternate, lanceolate or linear, entire, often stem-clasping. The under-mentioned species are those best known to cultivation. They are generally treated

FIG. 210. FLOWERING BRANCHES OF PODOLEPIS ARISTATA.

as annuals, and are well adapted for beds in a position fully exposed to the sun. A light and well-drained soil is most suitable. Seeds should be sown in April, in a gentle heat, and the seedlings transferred to the open air in June, about 1ft. apart. A sowing can also be made in the open during May or June, thinning out to 1ft. apart. *P. aristata* makes a very pretty subject for pot culture.

P. acuminata (taper-pointed). *fl.-heads* yellow, the florets exceeding the involucre; involucral bracts scarious. Summer. *l.* petiolate, oblong or lanceolate, smaller upwards and clasping the stem. *h.* 1½ft. Hardy annual. SYNS. *P. rugata* (R. G. 320), *Scalia jaccoides* (B. M. 956).

P. aristata (awned).* *fl.-heads* golden-yellow, with small, pink

Podolepis—*continued.*

ray florets. Summer. *l.* linear or lanceolate, stem-clasping, and often decurrent. *h.* 1ft. This hardy annual species closely resembles *P. acuminata*, but has its involucral bracts usually terminated by a fine bristle. See Fig. 210. SYN. *P. chrysantha.*

P. chrysantha (golden-flowered). A synonym of *P. aristata.*

FIG. 211. PODOLEPIS GRACILIS, showing Habit, detached Flower-head, and Portion of Stem with shortly decurrent Leaf.

P. gracilis (slender).* *fl.-heads* purple, lilac, or white; peduncles usually rather long. August. *l.* linear or lanceolate, stem-clasping, and often decurrent. *h.* 3ft. 1826. This pretty perennial species is a much more delicate plant than either of the preceding. See Fig. 211. (B. M. 2904; S. B. F. G. 285.)

P. rugata (wrinkled). A synonym of *P. acuminata.*

PODOLOBIUM. Included under **Oxylobium** (which *see*).

PODOPELTIS. Included under *Nephrodium.*

FIG. 212. PODOPHYLLUM PELTATUM.

PODOPHYLLUM (from *pous, podos*, a foot, and *phyllon*, a leaf; alluding to a fancied resemblance, in the five to seven-parted leaf, to the foot of some web-footed animal). Duck's-foot. ORD. *Berberideæ.* A small genus (three species) of hardy perennial herbs, with creeping rootstocks and thick, fibrous roots; one is a native of North America, the second of the Himalayas, and the third (not yet introduced) of Formosa, &c. Flowers white, solitary, terminal, shortly pedunculate, nodding; sepals six; petals six or nine. Berry indehiscent. Leaves peltate, palmately nerved and lobed; cauline ones one or two. The species thrive in moist, marshy, peat borders, in a shady situation. Propagated by division, and by seed.

P. Emodi (Emodi).* *fl.* 1in. to 1½in. across; sepals very deciduous; petals six, sometimes four, obovate-oblong; peduncle terminal in bud, then apparently supra-axillary. *fr.* red, 1in. to 2in. long, ellipsoid, edible. *l.* two, vernal, alternate, long-petiolate, plaited and deflexed in venation, orbicular, 6in. to 10in. across, three to five-lobed to the middle or base; lobes cuneate, acutely serrated. Stem or scape, 6in. to 12in. high, erect. India. (G. C. n. s., xviii. 241.)

P. peltatum (peltate). American Mandrake; May Apple. *fl.* nearly 2in. broad; bud with three green bractlets, which early fall away; stamens twelve to eighteen. *fr.* ovoid, 1in. to 2in. long, sweet, and slightly acid, edible, ripe in July. *l.* five to nine-parted; lobes oblong, rather wedge-shaped, somewhat lobed and toothed at the apex. Flowerless stems terminated by a large, round, seven to nine-lobed leaf, peltate in the middle, like an umbrella. Flowering stems bearing two one-sided leaves, with the stalk fixed near the inner edge. *h.* 6in. to 12in. North America, 1664. The leaves and roots of this plant are poisonous. See Fig. 212. (B. M. 1819; B. M. Pl. 17.)

PODOPTERUS (from *pous, podos*, a foot, and *pteris*, a wing; in allusion to the outer perianth segments being winged). ORD. *Polygoneæ.* A monotypic genus. The species is a handsome, greenhouse shrub, with rigid, flexuous branches and branchlets, usually spinescent at the tips. It requires a compost of equal parts loam and peat. Increased by young cuttings, which root readily, if inserted in any light soil, under a glass.

P. mexicanus (Mexican). *fl.* pink, small, twin or few in the axils of the bracts; perianth of six segments; fascicles racemose; racemes wavy at the tips of the branches, loosely sub-paniculate. July. *l.* obovate-oblong, membranous, slightly acute, attenuated at base, sub-sessile, 1in. long, ½in. or more broad, minutely puberulous, fasciculate in the nodes. *h.* 2ft. Mexico, 1825.

PODORIA. A synonym of **Boscia** (which *see*).

PODOSPERMA. A synonym of **Podotheca** (which *see*).

PODOSPERMUM. Included under **Scorzonera** (which *see*).

PODOSTEMACEÆ. A small natural order of aquatic, annual or perennial herbs, mostly very small, natives of rocky river-beds in the tropics. Flowers hermaphrodite, or, in one genus, dicœcious, variously disposed, but usually inclosed in a spathaceous, marcescent involucre, which is at first closed, then bursts; perianth membranous, trifid or five-parted, or wanting; stamens definite or indefinite, free or monadelphous, erect. The plants have a distinct or branched stem and leaves, or these are confluent into broad or narrow Alga-like fronds. The 120 species comprised in the order have little or no economic or garden value; they are classified in twenty-one genera. Examples are: *Apinagea, Hydrostachys*, and *Podostemon.*

PODOSTIGMA (from *pous, podos*, a foot, and *stigma*; alluding to the stalked stigma). ORD. *Asclepiadeæ.* A monotypic genus, the species being a half-hardy, glabrous or scarcely pubescent, erect herb. For culture, *see* **Asclepias.**

P. pubescens (pubescent). *fl.* orange-coloured, in four to six-flowered umbels, on lateral peduncles; corolla as long as the pedicel, longer than the peduncle, the oblong lobes wavy on the margins. July. *l.* erect, 1in. to 2in. long. Stem 6in. to 12in. high. Root tuberous. Southern United States, 1824. SYN. *Stylandra pumila.*

PODOTHECA (from *pous, podos*, a foot, and *theke*, a cell or capsule; alluding to the stalk of the fruit). SYNS. *Lophoclinium, Phœnopoda, Podosperma.* ORD. *Compositæ.* A genus comprising five species of glabrous or scabrous-pubescent, erect, hardy, Australian annuals, not woolly, or rarely the involucre very slightly so. Flower-heads yellow, homogamous, rather large, sometimes very long, on terminal peduncles, usually dilated under the involucre; involucre cylindrical, conical, or campanulate, with imbricated, herbaceous bracts; receptacle without scales; florets tubular, five-toothed. *P. gnaphalioides* is a plant of little beauty; it thrives in any ordinary garden soil, and may be readily increased by seeds.

P. gnaphalioides (Gnaphalium-like). *fl.-heads* on long peduncles; florets very slender, considerably longer than the involucre and pappus. June. *l.* linear or lanceolate, the lower ones narrowed below the middle, all stem-clasping, and sometimes shortly decurrent. *h.* 1ft. to 1½ft. 1841. (B. M. 3920.)

PŒCILIPTERIS. Included under *Acrostichum.*

PŒPPIGIA. A synonym of **Tecophilæa** (which *see*).

PŒSIA. Included under **Pteris** (which *see*).

POET'S CASSIA. *See* **Osyris.**

POET'S NARCISSUS. *See* **Narcissus poeticus.**

POGGENDORFFIA. Included under **Tacsonia** (which *see*).

POGOGYNE (from *pogon*, a beard, and *gyne*, a female; referring to the villous style). ORD. *Labiatæ.* A small genus (six species) of dwarf or erect, hardy annuals, natives of California. Flowers whorled, collected into dense, leafy spikes; calyx campanulate, five-toothed; corolla with a straight, exserted tube, and a bilabiate limb. Nutlets ovoid, smooth. Leaves linear, entire, or the upper or floral ones slightly conformed, long-ciliated, somewhat toothed. *P. Douglasii* is the only species introduced. Seed should be sown in pots, and the seedlings turned out into the open border.

P. Douglasii (Douglas'). *fl.*, corolla purple or dark violet; lower calyx teeth thrice as long as the tube; bracts linear, acute, almost leaf-like; spikes oblong, 2in. to 3in. long. August. *l.* petiolate, lin. to 1½in. long, oblong, obtuse, entire, gradually narrowed to the base, glabrous. Stem slightly branched. *h.* 1ft. 1871. (B. M. 5886.)

P. D. multiflora (many-flowered). A smaller form, with lilac corolla, and rather shorter bracts than the type.

POGON. A beard. The word is largely used in Greek compounds, and denotes any collection of long hairs.

POGONELLA. A synonym of **Simethis** (which *see*).

POGONIA (from *pogonias*, bearded; referring to the fringed lip of some of the original species). Including *Cleistes* and *Triphora.* ORD. *Orchideæ.* A genus comprising upwards of thirty species of stove, terrestrial orchids, with spherical tubers, broadly dispersed over the globe. Flowers solitary or loosely racemose, having free, conniving, or somewhat ringent sepals and petals, either all equal or the petals smaller; a free, erect, undivided or lobed lip, with its disk crested or papillose; a long, semi-terete, clavate column, eared or winged at the top; and a sessile or very shortly stalked two-celled anther, containing two furrowed pollen masses. Plants either having one or a few sessile leaves upon an erect stem at the period of flowering, or leafless till after flowering, and then producing a solitary, stalked leaf from an underground stem. The under-mentioned species thrive in well-drained pots or pans of open, loamy soil, amongst which is intermixed living sphagnum. An abundance of water is required during the season of growth, but after the leaves die off none must be administered until growth recommences the following season. All do well

Pogonia—*continued.*

in a warm, shaded greenhouse, in an airy position near the glass.

P. discolor (different-coloured). *fl.* in pairs, 1½in. in diameter; sepals and petals dirty grey-green, ⅔in. long, spreading; lip white, with a green disk, convolute; scape solitary, 2in. to 3in. long. *l.* solitary, 3in. to 5in. in diameter, nearly horizontal, orbicular-cordate; upper surface dark rufous-green, often with paler blue-green blotches, bristly; under surface dull purple, less bristly. Java. (B. M. 6125.)

P. Fordii (Ford's).* *fl.* drooping, 1½in. from tip of dorsal sepal to that of the lip; sepals and petals similar, linear-oblanceolate, acuminate, dirty-yellowish, with three brown nerves; lip as long as the sepals, glabrous, convolute portion white; lobes rose-coloured. *l.* shortly stalked, orbicular, acute, plaited by about twelve strong nerves; upper surface dull brownish-green and purple, sparsely clothed with crystalline, cellular hairs; under surface rose-coloured. Hong Kong, 1883. SYN. *P. pulchella* (B. M. 6851).

P. Gammieana (Gammie's).* *fl.* six to eight in a raceme; sepals and petals pale lilac, streaked with pale pink, ⅔in. to 1in. long; lip pale green, as long as, or rather longer than, the sepals; scape 6in. to 8in. high. May. *l.* solitary, quite glabrous, 4in. to 6in. long and broad, with a very deep sinus; young ones plaited between the nerves, with a row of very shallow, broad pits on each fold; petiole streaked with red-brown. Sikkim, 1847. (B. M. 6671.)

P. ophioglossoides (Ophioglossum-like). Snake's-mouth Orchis. *fl.* rose-pink, 1in. long, sweet-scented; lip spathulate below, appressed to the column, beard-crested and fringed. June and July. Stem 6in. to 9in. high, bearing a single oval or oblong-lanceolate leaf near the middle, and a smaller one or bract near the terminal flower, rarely one or two others with a flower in their axil. North America, 1816. (B. R. 148; H. E. F. 70.)

P. pendula (pendulous). Three Birds Orchis. *fl.* pink, drooping, on slender pedicels; lip spathulate, somewhat three-lobed, roughish or crisped above, crestless. August. *l.* three to seven to a stem, alternate, ovate-amplexicaul, 3in. to 6in. long, the upper one to four bearing flowers in their axils. Stem 3in. to 8in. high, from oblong tubers. North America, 1824. (B. R. 908.) SYN. *Triphora pendula.*

P. pulchella (pretty). A synonym of *P. Fordii.*

P. rosea (rosy). *fl.*, sepals greenish outside, lake-coloured inside; floral envelopes lilac, approaching pink; lip with two whitish, ovate glands at the base; scape terete and smooth. August *l.* lanceolate, acute, stem-clasping, marginate, smooth, entire. *h.* 3ft. to 5ft. Guayana, 1844. A beautiful plant.

POGONIA (of Andrews). A synonym of **Myoporum** (which *see*).

POGONOPUS (from *pogon*, a beard, and *pous*, a foot; in allusion to the shape of the flower). SYNS. *Chrysoxylon, Howardia.* ORD. *Rubiaceæ.* A genus comprising about five species of stove trees and shrubs, with terete branchlets, natives of tropical America. Flowers pink, showy, pedicellate, disposed in terminal, branched panicles; calyx five-toothed, deciduous; corolla with an elongated tube and a limb of five short, valvate lobes. Leaves opposite, petiolate, ample, membranous; stipules intrapetiolar, small, deciduous. *P. caracasensis* (the only species in cultivation) requires culture similar to **Mussænda** (which *see*).

P. caracasensis (Caraccas). *fl.* pink; calyx teeth triangular, acuminate, the lobes foliaceous, ovate; corolla tubular, hairy. Summer. *l.* ovate or obovate-elliptic, rather long-acuminate, the point very acute, base cuneate, pubescent beneath. Shrub. 1855. (B. M. 5110.) SYN. *Howardia caracasensis.*

POGOSTEMON (from *pogon*, a beard, and *stemon*, a stamen; alluding to the filaments being generally bearded in the middle). SYN. *Wensea.* ORD. *Labiatæ.* A genus comprising about thirty species of stove or greenhouse herbs (or shrubs?), natives of the East Indies, the Malayan Archipelago, and Japan. Flowers disposed in many- or rarely few-flowered whorls; calyx ovoid-tubular, equal, five-toothed, often elongated during fructescence; corolla tube included or rarely shortly exserted; limb spreading, cut into four sub-equal lobes; bracts usually small. Nutlets ovoid or oblong, smooth. Leaves opposite. The only species now in cultivation are those described below. For culture, *see* **Colebrookia.**

P. Patchouli (Patchouly). *fl.* whitish, tinged with purple, small, in dense spikes, which are both terminal and axillary

Pogostemon—*continued.*

June. *l.* broadly ovate, stalked, 3in. to 4in. long. *h.* 3ft. East Indies, 1848. Greenhouse soft-wooded shrub. This species affords the celebrated Patchouli perfume, or Pucha-pat, of the Hindoos; the odour is very peculiar, and even disagreeable to some people, but, in India, it is one of the commonest perfumes found in the bazaars.

P. plectranthoides (Plectranthus-like). *fl.* white, sub-secund, glomerately spicate; calyx and bracts coloured at top, villous; spikes ovate-cylindrical, pedunculate, panicled. July. *l.* ovate, cuneated or rounded at base, doubly serrated; cauline ones 2in. to 3in. long; upper ones small; uppermost bract-like. Stem 2ft. to 3ft. high; branches obtusely tetragonal. East Indies. Stove shrub. (B. M. 3238.)

POINCIANA (named after M. de Poinci, Governor of the Antilles in the middle of the seventeenth century, and a patron of botany). Flower Fence. ORD. *Leguminosæ.* A genus consisting of only three species of stove, evergreen, unarmed trees, natives of the warmer parts of Eastern Africa, the Mascarene Islands, and the Western Provinces of India. Flowers orange or scarlet, showy, corymbosely racemose at the apices of the branches; calyx segments valvate; petals five, orbiculate, imbricated; stamens ten, free. Pods elongated, flat, compressed, hard, two-valved. Leaves bipinnate; leaflets small, numerous; stipules inconspicuous; bracts small, very caducous. For culture, *see* **Cæsalpinia.**

P. pulcherrima (very pretty). *fl.* on very long pedicels; petals orange-yellow, rarely red, 1in. long, exceeding the calyx, often lacerated on the margins; racemes terminal, pyramidal. July. Pods flat-compressed, 4in. to 5in. long. *l.*, pinnæ three- to nine-jugal; leaflets five- to ten-jugal, ½in. long, oblong or spathulate-oblong, rounded or sub-truncate at the mucronulate tip. *h.* 10ft. to 12ft. West Indies, &c., 1691. Prickly shrub. (B. M. 995.) *Cæsalpinia pulcherrima* is the correct name of this shrub.

P. regia (royal). Royal Peacock Flower. *fl.* bright scarlet, in loose racemes, terminal, and from the axils of the upper leaves; petals almost orbicular, spreading, reflexed, tapering into long claws, veined on the upper side, and dashed with yellowish lines above the base; upper petal variegated and striated with red and yellow; stamens ten; filaments red; pedicels alternately patent. Summer. Pods about 4in. long. *l.* broadly ovate, 2ft. long, very patent, abruptly bipinnate, with from eleven to eighteen pairs of horizontally patent pinnæ, which are 4in. long; pinnules oblong, blunt, on very short petioles; base of common petiole fleshy. Trunk erect, 3ft. in diameter. *h.* 30ft. to 40ft. Madagascar. A magnificent tree. (B. M. 2884.)

POINSETTIA. Included under **Euphorbia** (which *see*).

POIRETIA (named in honour of J. L. M. Poiret, a French botanist and traveller in Barbary, about 1785). SYN. *Turpinia* (of Persoon). ORD. *Leguminosæ.* A genus of five species of twining or rarely sub-erect, gland-dotted, stove, perennial herbs or sub-shrubs, natives of South America, mostly Brazil, one extending to Central America and the warmer parts of Mexico. Flowers yellow, in small, axillary racemes, or paniculate at the tips of the branches; standard broadly orbiculate, reflexed; wings falcate-oblong. Pods linear. Leaves pinnate; leaflets four or rarely three, often minutely stipellate; stipules sessile or shortly decurrent at base. The species are little known in cultivation. For culture, *see* **Pictetia.**

P. scandens (climbing). *fl.*, racemes few-flowered, shorter than the petioles. *l.* with two pairs of obovate, retuse leaflets, full of pellucid dots. Stems climbing, glabrous. Caraccas, 1823. Herb. SYN. *Turpinia punctata.*

POIRETIA (of Cavanilles). A synonym of **Sprengelia** (which *see*).

POIRETIA (of Smith). A synonym of **Hovea** (which *see*).

POISON BERRY. A name applied to several species of *Cestrum.*

POISON BULB, ASIATIC. *See* **Crinum asiaticum.**

POISON OAK. *See* **Rhus Toxicodendron.**

POIS-PERDRIX. *See* **Heisteria.**

POITÆA (named after M. Poiteau, a French botanist, author of "Flore Parisienne," 1808-13). ORD. *Leguminosæ.*

Poitæa—*continued.*

This genus comprises only a couple of species of stove shrubs, natives of St. Domingo and Cuba. Flowers rose or purple, pendulous, in axillary racemes; pedicels solitary; standard obovate, erect; wings oblong, longer than the standard. Pods linear, flat-compressed, two-valved. Leaves impari-pinnate; leaflets many, membranous, entire, ex-stipellate; stipules setaceous. *P. galegoides* requires similar culture to **Sabinia** (which *see*).

P. galegoides (Galega-like). *fl.* rose-purple, and, as well as the pods, nodding. June. *l.*, leaflets twelve to fifteen pairs, ¼in. long, oblong, mucronate, and, as well as the branches, clothed with adpressed pubescence; petioles wingless. *h.* 1ft. St. Domingo, 1826.

POIVREA (named after P. Poivre, a French traveller and administrator, born at Lyons in 1719, died in 1786). ORD. *Combretaceæ.* A small genus of tropical and sub-tropical, stove, evergreen climbers, included, by Bentham and Hooker, under **Combretum** (which *see* for characters and culture).

P. coccinea (scarlet). *fl.* scarlet, loosely disposed, secund; panicles of many spikes. June to December. *l.* oblong-lanceolate, acute, dark green, shining. Madagascar, 1818. SYN. *Combretum purpureum* (B. R. 429).

P. grandiflora (large-flowered). A synonym of *Combretum grandiflorum.*

POKE or **POKE WEED.** *See* **Phytolacca.**

POLANISIA (from *poly*, many, and *anisos*, unequal; in allusion to the numerous and unequal stamens). ORD. *Capparideæ.* A genus (now merged into *Cleome*) comprising about fourteen species of pretty, hardy, annual herbs, often glandular and strong-smelling, mostly tropical and sub-tropical, one being an inhabitant of all the warmer regions of the globe. Sepals lanceolate, free or connate at base, deciduous; petals sessile or unguiculate, entire, equal or unequal, imbricated. Leaves simple or three to nine-foliolate; upper ones bract-like. Seeds should be sown in a hotbed frame, and turned out into a sheltered position in the open border, about the middle of May.

P. Chelidonii (Chelidonium). *fl.* rose; stamens twenty-four to thirty-two. June. *l.* seven to nine-foliolate; leaflets obovate-cuneate. *h.* 1½ft. East Indies, 1792. Plant hispid-pilose.

P. dodecandra (twelve-anthered). *fl.* white; stamens eight to twelve. June. *l.* trifoliolate; leaflets glabrous, elliptic-lanceolate, slightly serrulate. *h.* 1½ft. East Indies, 1795. Plant scabrous-puberulous.

P. graveolens (strong-smelling). *fl.* small; calyx and filaments purplish; petals yellowish-white; stamens eight to twelve. June to August. *l.* with three oblong leaflets. *h.* 1½ft. North America. Plant glandular-pilose.

POLEMANNIA. A synonym of *Dipcadi.*

POLEMONIACEÆ. A natural order of glabrous, pubescent, or slightly viscid, erect or twining herbs, rarely shrubs, the majority of which are found in (mostly Western) North America and the Andes of South America, a few being natives of Europe and temperate Asia. Flowers variously coloured, hermaphrodite, usually showy, regular or scarcely oblique, at the tips of the branches, or sometimes solitary or twin in the axils, sessile or stalked, sometimes corymbose-cymose, capitate, or loosely paniculate; calyx campanulate or tubular, five-fid, with imbricated lobes, or rarely three to five-fid or valvate; corolla gamopetalous, funnel-salver or bell-shaped, or rotate, the limb of five twisted lobes; stamens five, alternate with the corolla lobes. Fruit a capsule. Leaves alternate or opposite, entire or variously dissected. "In some countries, the leaves of *Polemonium cæruleum* are applied to ulcers following contagious diseases, and the Russians give a decoction of it in cases of hydrophobia" (Decaisne and Le Maoût). The order comprises eight genera and not more than 150 species. Well-known illustrative genera are: *Collomia*, *Gilia*, *Phlox*, and *Polemonium.*

POLEMONIUM (an ancient Greek name, used by Dioscorides, from *polemos*, war; of doubtful application). ORD. *Polemoniaceæ.* A genus comprising eight or nine

Polemonium—*continued.*

species of ornamental, tall or dwarf, hardy, perennial or rarely annual herbs, natives of Europe, temperate Asia, North America, Mexico, and Chili. Flowers blue, violet, or white, generally showy; calyx campanulate, five-fid; corolla shortly funnel-shaped, broadly campanulate, or sub-rotate, with obovate lobes; cymes terminal, loosely corymbose or sub-capitate. Leaves alternate, pinnatisect. Rhizomes usually creeping, thick or slender. The best-known species are described below. They are all perennials, and are of easy cultivation in any good garden soil, but flourish best in a deep, rich, and well-drained loam. Propagated very readily by division.

FIG. 213. FLOWERING STEM OF POLEMONIUM CÆRULEUM.

P. cæruleum (blue).* Charity; Greek Valerian; Jacob's Ladder. *fl.* normally blue, erect, corymbose, with roundish-oval, obtuse petals. Early summer. *l.* pinnate; leaflets ovate-lanceolate, acuminate, glabrous. Stem glabrous, angular and fistular. *h.* 2ft. Northern hemisphere (Britain). An elegant border perennial, of which there are numerous varieties, varying chiefly in the colour of the flowers. See Fig. 213. (Sy. En. B. 922.) A handsome form is that having variegated foliage and white flowers.

P. c. dissectum (dissected). *l.* bipinnate; leaflets petiolate, pinnatifid; segments linear. (S. B. F. G. 182, under name of *P. sibiricum.*)

P. confertum (clustered).* *fl.* rich blue, funnel-shaped, about ½in. across, clustered on the ends of the stalks. Summer. *l.* linear, pinnate; pinnæ very numerous and overlapping, varying from roundish-ovate to linear-oblong. *h.* 6in. Rocky Mountains, &c., 1885. See Fig. 214. (G. C. n. s., xxiv. 3.)

P. humile (dwarf).* *fl.* blue or purplish, in drooping, sub-corymbose panicles; segments of corolla ovate, acutish. July.

Polemonium—*continued.*

l., leaflets ovate, obtuse, mostly radical, and with a faint smell of musk. Stems many, leafy, downy. *h.* 6in. Rocky Mountains, 1827. SYNS. *P. Richardsonii* (B. M. 2800) and *P. villosum* (S. B. F. G. 266).

P. h. pulchellum (pretty). *fl.* smaller than in the type; corolla lobes violet or lavender-blue, in some forms nearly white, only two to three lines long. *l.*, leaflets often nearly glabrous and naked SYN. *P. pulcherrimum* (B. M. 2979).

FIG. 214. POLEMONIUM CONFERTUM, showing Habit and detached Flower.

P. mexicanum (Mexican). *fl.* blue, few, corymbose; corolla sub-rotate-campanulate. April. *l.* pinnate, downy; segments ovate or oblong. Stem loosely branched. *h.* 9in. North America, 1827. Plant viscous-pubescent. (B. R. 460.)

P. pulcherrimum (very pretty). A synonym of *P. humile pulchellum.*

FIG. 215. POLEMONIUM REPTANS, showing Habit and Portion of detached Inflorescence.

P. reptans (creeping).* *fl.* blue, sometimes white, drooping, disposed in a loose, panicled corymb; segments of corolla cuneate. April. *l.* pinnate; leaflets seven to eleven, ovate, acute, glabrous. Stems leafy, glabrous. Root creeping. *h.* 6in. North America, 1758. See Fig. 215. (B. M. 1887.)

P. Richardsonii (Richardson's). A synonym of *P. humile.*

P. villosum (villous). A synonym of *P. humile.*

POLIA. A synonym of *Cypella.*

POLIANTHES (name given by Linnæus, probably from *polios*, white, and *anthos*, a flower; alluding to the colour of the blossoms). Erroneously spelt *Polyanthus.*

Polianthes—*continued.*

Tuberose. ORD. *Amaryllideæ*. A monotypic genus. The species is a splendid, half-hardy, bulbous plant. Tuberoses may be had in flower throughout the greater part of the year by potting successional batches of bulbs. They are imported at the latter end of the year, but a portion may be kept for successions. Loam, with a little manure or leaf mould intermixed, is a suitable compost, and 5in., or at the most 6in., pots are large enough. The bulbs may be inserted singly or three in a pot, and plunged at once in a bottom heat of from 60deg. to 70deg.; water should be withheld until the leaves appear, unless the soil becomes very dry; afterwards, it may be given freely. The flowers are pure white, and very highly perfumed; when detached singly, they are very useful for buttonhole and other bouquets. As the plants naturally grow tall, they should be kept in a light position, to induce them to keep as dwarf as possible. They will succeed during summer in any cool house, or may be planted in an open border. The bulbs are not usually kept after one year.

P. tuberosa (tuberous).* *fl.* white, delightfully fragrant, showy, disposed in a long, terminal, simple raceme; perianth funnel-shaped and incurved; stamens affixed at the throat. Autumn. *l.* radical or on the lower part of the stem. Stem or rhizome short, tuberous, erect, simple. *h.* 3ft. to 4ft. Mexico (cultivated in American, Asiatic, and European gardens), 1629. (B. M. 1817; B. R. 63.) The double-flowered form is that principally grown. There are several varieties, such as DOUBLE AFRICAN, DOUBLE AMERICAN, DOUBLE ITALIAN, and PEARL, and, of these, the last-named is most preferable, it being not so tall in growth as the others.

POLISH JUNIPER. *See* **Juniperus communis cracovia.**

POLIUM. Included under **Teucrium** (which *see*).

POLLEN. The coloured dust found in all mature flowers, except the few that are entirely female. It is found in the anthers, or thick heads of the stamens, and is set free, in the form in which it is best known, by the bursting of the walls that surround the spaces in which it is formed, and in which it is retained till ripe. In order to render this account of Pollen more clear, it is necessary to give a short account of the development and structure of anthers. The anther is the essential part of each stamen. In most cases, it is supported on a stalk or filament. It is at first made up of a mass of small cells, almost alike in form and size; but changes go on during its growth, and, when mature, one can recognise in it the various structures described below. The whole anther is covered with an outer layer of cells known as the epidermis. In the centre lies a column of thin-walled cellular tissue, called the connective, with a fibro-vascular bundle in the middle of it. At each side of this are two spaces or loculi, in which lie the Pollen grains till the spaces burst. Each is lined by a thin, dark layer of disorganised cells, known as the endothecium. Between these and the epidermis lies a tissue, known as the mesothecium, generally composed of several layers of cells. These cells, called "fibre cells," are usually peculiar in having the walls thickened with deposits, variously arranged in spirals, rings, networks, arches, and several other figures. The fibre cells are usually absent in a line near the thin partition between the loculi on each side; and the wall of each space is weakest where they are absent. Hence, when the spaces burst from pressure exerted on the walls of each in growth, the opening usually forms along the lines left unstrengthened. The amount and arrangement of the fibre cells vary greatly in different anthers, and the modes of bursting vary in agreement with these.

The Pollen grains are formed in the loculi as follows: In each of four places in the young anther, a group of cells becomes different from those lying around them in the larger size of the individual cells, which form others in the ordinary method by division. At last, a

Pollen—*continued.*

considerable number is formed, and they are called the "parent cells of the Pollen." In each parent cell, the contents group themselves together, and form four cells, the Pollen grains. There are differences in detail in different plants in the development of Pollen; but the usual course is that the walls of the mother cell waste away, and, it is believed, assist to nourish the grains, and to form the spines on the exterior of many kinds of Pollen. The Pollen grains at last lie in the loculi like a powder. The endothecium is, at first, a layer of thin-walled cells, with abundance of protoplasm; but the Pollen is nourished, in part, at the expense of these cells also; and there remains, to indicate its former existence, only the thin layer already noticed.

Pollen grains are usually free, but, in many plants, development seems arrested early; *e.g.*, in Heaths, the four cells developed from each "parent cell" remain united together. In some Acacias, the Pollen grains are made up of from eight to thirty-two united cells. In Orchids, the grains in each loculus often stick together in pyriform masses, called pollinia. These peculiarities are the result of incomplete solution of the walls of the parent cells, since these remain and bind the Pollen grains together. The grains possess two coats

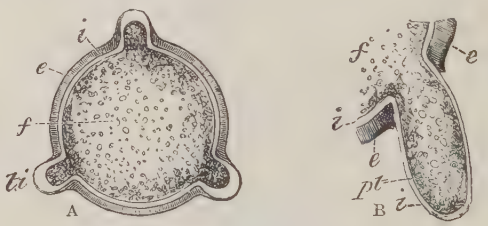


FIG. 216. POLLEN OF EPILOBIUM ANGUSTIFOLIUM.

A, Section of Pollen Grain—*e*, Extine; *i*, Intine; *ti*, Thick Intine; *f*, Fovilla. B, Growing Point of Pollen Grain—*e*, *e*, Extine; *i*, *i*, Intine; *f*, Fovilla; *pt*, Pollen Tube.

(extine and intine) (see Fig. 216, A). The inner consists of cellulose, is, in general, thin, and can be stretched, especially so in the form of a tube (see Fig. 216, B), protruded from the grain, when it lies on the stigma of the same species of plant, or is placed in a drop of weak solution of sugar. There are no openings in this coat. The outer coat differs from the inner, inasmuch as it is not extensible, and consists of a substance like cuticle in its chemical composition. This coat is entirely absent from the Pollen grains of *Zostera*, and of a few other plants that flower under water. It is occasionally uniformly spread all over the grain, and must be burst off before the Pollen tube can be protruded; but, in general, it is pierced by pores, or slits, of definite form and number for each species of plant. Through these openings one or more Pollen tubes are pushed when conditions favour their growth. The surface of the extine is smooth in many Pollen grains, but in most it bears characteristic outgrowths in the form of ridges, *e.g.*, in many *Compositæ*, or of spines, *e.g.*, in Mallow, Mistletoe, or of granules, as in many Dicotyledons. The nature of the surface in different Pollen grains is closely connected with the modes in which the Pollen is conveyed from the anthers to the stigma (*see* **Pollination**). In form, the Pollen grains differ very greatly in different plants. The most common forms are spherical, and oval with rounded ends; but many others exist, such as cubical, triangular, cylindrical, and polygonal. The form seems rather constant within the limits of genera, but varies greatly within certain families. Hence, the form of Pollen grains is of little value as an indication of affinities between plants,

Pollen—*continued.*

beyond genera; nor does similarity of form of grain necessarily indicate affinity. *Zostera* possesses one of the most curious forms, the grains in this plant being long, and extremely slender and thread-like. The colour, in most plants, is some shade of yellow, but in some it is deep orange (*Lilium tigrinum*), or red (*Verbascum*), or blue (*Scilla*), or deep purple, approaching black.

The contents of the grain are known as the fovilla. They consist of viscid protoplasm, full of small starch granules and oil-drops. Amidst this mass, in general, lie two bodies, like nuclei, the nature of which has been made clear, by the researches of Elfving and of Strasburger, within the past few years, and is most easily understood if we look to the Pollen of *Coniferæ*. In the Scotch Fir, the very light Pollen has the outer coat prolonged into two outgrowths containing air, which render the grain light. There is comparatively little difficulty in making out that there are three cells contained within the large cell seen in the middle, and the multicellular nature of the grain remains evident throughout its existence in the Fir.

In other *Coniferæ*, *e.g.*, the Yew, the Pollen is egg-shaped, and there is a small part cut off by a partition at the smaller end, rendering the grain two-celled; each cell has a nucleus. In Monocotyledons and Dicotyledons, the structure is less easily traced. In some (*e.g.*, in Pollen grains of Orchids), a small part at one angle of the cell contents becomes separated from the rest, (though a cell wall does not form between), and is called the "vegetative cell." It draws itself away from the side wall, and becomes imbedded in the contents of the large cell. For a time, it remains different in form from the nucleus of the large cell, but ultimately it becomes quite like that nucleus, so that there seem to be two nuclei. The vegetative cell, in many Pollen grains, breaks up into two or more cells, and, in some (*e.g.*, *Scirpus palustris*), the process becomes quite complex. When the Pollen tube is formed, the nucleus and the vegetative cell, or cells, pass into it, and have been traced into the end of it that passes down the micropyle and comes into contact with the helper cells (*see* **Ovule**). It is supposed that they perform some very important function in the formation of the embryo. The formation of the vegetative cells in the interior of the Pollen grains is generally regarded as representing the formation of the male prothallium in such Cryptogams as *Selaginella*. *See* **Prothallium.**

POLLICARIS. The length of the terminal joint of the thumb; 1in.

POLLICHIA. A synonym of **Trichodesma** (which *see*).

POLLINATION. The dusting of the stigma of a flower with pollen grains, as distinguished from fertilisation, or the action of the pollen upon the ovule, which gives rise to the development of the seed containing an embryo. Pollination must precede fertilisation. It is effected in very different ways in different flowers, and the agents by which it is effected are manifold. The more important of these are here indicated; but the account must be brief, though volumes have been written upon the subject of Pollination. Full information of the present state of our knowledge of the matter will be found in Dr. H. Müller's "Fertilisation of Flowers," translated by Prof. W. D'A. Thompson; Darwin's "Fertilisation of Orchids;" and Kerner's "Flowers and their Unbidden Guests," translated by Dr. Ogle. Sir John Lubbock's "British Wild Flowers in Relation to Insects" contains much interesting information regarding the subjects indicated in the title. There are also many shorter works and articles upon Pollination published in most European languages of late years. A list of these, compiled by

Pollination—*continued.*

Prof. Thompson, is included in Müller's work referred to above, and includes almost all published up to 1883.

The method of Pollination varies with the structure of the flower. In those plants in which the pollen and the ovules of the same flower ripen simultaneously, the pollen may be transferred directly from the anthers to the stigma either by the parts lying in contact, or by their lying in such a position that the pollen falls from the anthers upon the stigma. In cleistogamous flowers, or those (*e.g.*, in Sweet Violets, Wood Sorrel) which, in certain plants, are formed in summer and autumn, and never open, but yet are often more productive of seeds than the conspicuous flowers, the pollen, while in the anthers, pushes pollen tubes to the stigma, which is thus Pollinated. In by far the greater number of hermaphrodite flowers, even of those in which the pollen and the stigma mature simultaneously, the pollen is prevented from falling upon or reaching the stigma by the arrangement of the parts. Necessarily, in those hermaphrodite flowers in which the pollen and the stigma do not mature simultaneously, the pollen cannot reach the stigma of the same flower (*see* **Proterandrous** and **Proterogynous**). In all these cases, the pollen must be transferred from the anthers to the stigmas by some agency from outside the flower; and this must be so yet more evidently in the case of unisexual flowers, whether male and female flowers be on the same plant or on different ones. The chief agents that effect Pollination in British plants are wind and insects. A few plants are adapted for conveyance of pollen by currents of water; and, in the tropics, humming-birds, and certain other birds, probably aid materially. It is unnecessary to refer further to these latter agencies, since they would probably not come under notice in gardening operations at all in the British Islands. Plants suited for fertilisation by wind are usually called "anemophilous," or wind-lovers (from *anemos*, the wind, and *phileo*, I love). Those adapted to have the stigmas Pollinated by insects, are called "entomophilous," or insect-lovers (from *entomon*, an insect, and *phileo*, I love). They differ from one another so widely that a practised observer can conjecture almost with certainty to which group any flower would belong, though previously quite unacquainted with the flower. The more distinctive characters of the two are as follows: Anemophilous flowers are seldom large or conspicuous individually; the sepals and petals are small, usually regular, often absent, or reduced to one row of small, scaly bodies (*e.g.*, Oak); they seldom contain nectar, or afford other attractions for insect visitors; the stamens have long filaments, with versatile anthers, that turn with the least breath of wind, and thus shed readily the loose, powdery, smooth pollen, which is often produced in very great amount. The grains are very light, and are occasionally (*e.g.*, in Firs) rendered relatively lighter by means of dilatations of the outer coat filled with air. The stigma in such plants is usually furnished at the end (Pellitory) or along the sides (Grasses, &c.) with a quantity of long, simple or branched hairs, which frequently hang out beyond the perianth, or other coverings, *e.g.*, beyond the glumes in Grasses, and entangle the pollen grains when these are carried against them by the wind. Anemophilous plants are often social. Many trees under this group produce their flowers in spring, before the leaves, thus preventing great loss of pollen among the leaves, and favouring Pollination. Entomophilous flowers are the reverse of all this. They are almost always more or less individually conspicuous, with well-developed, coloured petals, and often also coloured sepals, or are crowded in showy masses. They are sometimes regular, but more generally are only bilaterally symmetrical—*i.e.*, they have the two sides alike, as in most Orchids and *Leguminosæ* (see

Pollination—*continued.*

Fig. 217). They very often have special structures, *e.g.*, spurs or other modifications of parts, to form or to store up nectar. They also possess a pleasant scent, and attract numerous insect visitors by the varied inducements they offer. Some insects (*e.g.*, Bees) also visit flowers to eat or to collect pollen, or to carry it away as food for their young progeny. Whatever the reason of

FIG. 217. EXPANDED BLOSSOM OF PEA—*v*, Vexillum; *al*, Alæ, with Carina between.

the visit, the insect generally becomes dusted with pollen, which it transfers to the stigma of the next flower of the same species that it enters. The pollen in entomophilous flowers is less abundant than in the anemophilous ones; and the grains very frequently bear ridges or spines, so as to stick more readily to the insect, or they are joined together in groups of four or more, as in

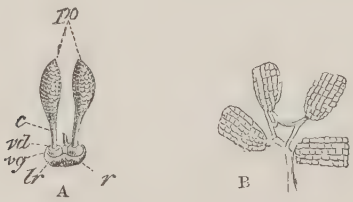


FIG. 218. POLLEN OF ORCHID.

A, Pollen Masses, &c.—*po*, Pollinia; *c*, Caudicle; *vd*, Viscid Disk; *vg*, Viscid Globe; *r*, Rostellum; *lr*, Lip of Rostellum. B, Pollen Granules (much magnified), held in packets by thin, elastic threads.

Heaths and Orchids (see Fig. 218). The masses are furnished, in Orchids and a few other plants, with special contrivances to favour adhesion to the insect's body, and afterwards to place them in the best position to touch the stigma of the flower next visited (*see* **Orchid Fertilisation**). The stamens are usually inclosed in, or are not longer than, the perianth, and the anthers burst in such a way as to let free the pollen in the position most likely to insure its being dusted on to the insect. The stigma or stigmas do not often project beyond the perianth, and are generally small and rounded, or linear, down one side of the style. The surface is usually covered with a layer of erect cells, which secrete a viscid fluid, and in this the pollen grains are caught when any part of an insect's body dusted with them touches the stigmatic surface. The pollen grains absorb nourishment from this fluid, and are stimulated to emit pollen tubes between the cells of the stigma and down the tissues of the style to the ovules, to fertilise them.

Both anemophilous and entomophilous flowers are adapted to secure cross-fertilisation, or "allogamy"; while cleistogamous flowers, and a few others, are adapted for self-fertilisation, or "autogamy." Darwin and others have shown that allogamy secures the largest production of healthy seeds, and that the seedlings are stronger and healthier than when the stigmas are artificially fertilised with pollen from the same flower. The

Pollination—*continued.*

disadvantages of allogamy are that it entails on the plant a greater production of pollen, as by far the greater part never reaches a stigma; and, even with this, many stigmas may remain unpollinated, and no seeds be produced in these flowers. Moreover, such flowers as have been specially adapted for fertilisation by a certain kind, or kinds, of insects, may, in absence of these agents, remain unpollinated and barren. This occurs with certain greenhouse plants, which are fertile if Pollinated artificially, but, without human aid, remain barren, *e.g.*, various Orchids. Under **Nectary** and **Orchid Fertilisation** several adaptations of flowers to benefit by visits of insects will be found discussed, and only one or two examples need here be added to those referred to under the above headings. By far the most interesting examples of adaptations for Pollination of the stigmas with pollen from another flower, are met with among entomophilous flowers. Many of these are suited to benefit by the visits of Beetles, Sawflies, and other insects, which do not possess a long proboscis; hence, the nectar or pollen that attracts them is situated almost on the surface, or, at least, is easily accessible,

FIG. 219. STRAWBERRY PLANT IN FLOWER, showing the numerous short Stamens, readily accessible to Insects.

e.g., in the Strawberry (see Fig. 219). Such flowers may have the pollen transferred from the anthers to the stigma of the same flower; but this is, in general, prevented by the pollen and the stigmas not maturing simultaneously (dichogamy), or by the direction in which insects usually move on flowers, causing them to touch the stigmas *before* they touch the pollen. Flowers of this kind are often small individually, but are grouped into conspicuous masses, *e.g.*, in *Umbelliferæ* and *Compositæ*; and, in such cases, the outer flowers often differ much from the inner in the inflorescence. This difference is extreme in such plants as the Guelder Rose (*Viburnum Opulus*), and in *Hydrangea*, where the outer flowers have the perianth large and showy, but the sexual organs abortive, and the inner flowers are small, but sexually perfect, except in such garden varieties as have all the flowers rendered showy and barren.

But even among open and regular flowers examples occur in which very perfect adaptations for cross-pollination are present. *Kalmia latifolia* (see Fig. 220) may be selected as an example. In this plant, the style rises in the middle of the flower, bearing the small stigma on its tip. There are ten stamens, curved as shown in the figure, so that the anthers are situated each in a small pouch in the corolla. In these pouches they remain till the filaments are touched with a little force, and, if the

Pollination—*continued.*

flowers are protected under net or glass, they wither and fall without the anthers getting free or the stigma being Pollinated, and the flowers remain barren. But, in the natural condition, the flowers are freely visited by various Bees, and other insects, which usually alight on the style, and, in sucking the nectar, come into contact with the filaments, and set free the anthers one by one. The filaments straighten themselves, and the pollen

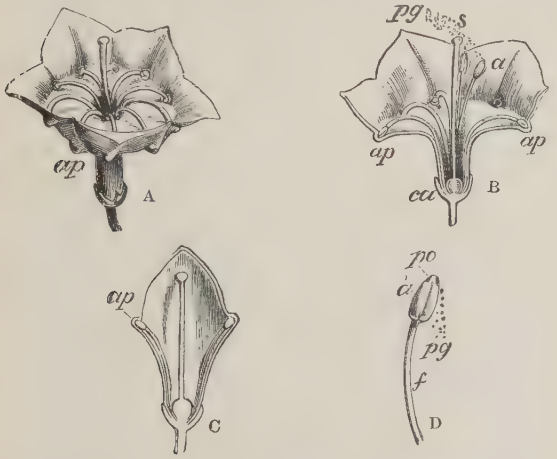


FIG. 220. DETAILS OF KALMIA LATIFOLIA.

A, Expanded Flower—*ap*, Anther Pocket. B, Section of Expanded Flower—*ap*, *ap*, Anther Pockets; *s*, Stigma; *a*, Free Anther; *pg*, Pollen Grains in Shower; *ca*, Calyx. C, Section of Flower Bud—*ap*, Anther Pocket. D, Stamen, more enlarged—*a*, Anther; *po*, Pores; *pg*, Pollen Grains; *f*, Filament.

is thrown out of the anther, from two small holes at the tip (see Fig. 220, D), against the insect's body, to be thus transported to the stigma of another flower. Such flowers as characterise the *Labiatæ*, the *Orchideæ*, and the papilionaceous *Leguminosæ*, in possessing bilateral symmetry, are among the peculiarly entomophilous types, especially when the nectar is so placed as to be accessible only to insects possessed of a long proboscis,

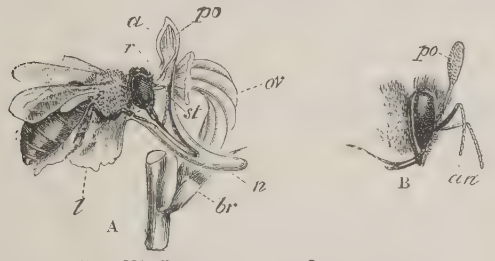


FIG. 221. POLLINATION OF ORCHID.

A, **Flower** of *Orchis Morio* (Sepals, two Petals, and side of Spur removed), with Hive Bee sucking Nectar—*a*, Anther; *po*, Pollinium; *r*, Rostellum; *st*, Stigma (side view); *l*, Labellum; *ov*, Ovary; *n*, Nectary; *br*, Bract. B, Head of Bee, carrying (*po*) Pollinium—*an*, Antennæ.

e.g., Bees (see Fig. 221). In addition to this, in some *e.g.*, in *Antirrhinum* (see Fig. 222), the corolla is closed by the lower lip, which is pressed against the upper one, and excludes all but insects heavy enough to depress it, *e.g.*, Humble Bees. In the strictly entomophilous flowers, very striking adaptations to favour the visits of insects of certain groups, or even of certain species, and to exclude other insects, are often met with. But the field is so wide, that to give examples would far exceed the

Pollination—*continued.*

space here available. Readers are therefore referred to the works noted above, and their attention is called to a subject of the utmost interest in itself, and of great practical value in its relations to hybridising

FIG. 222. FLOWER OF ANTIRRHINUM ORONTIUM.

plants, and to the development of new races of value for their beauty, or for other properties suited to commend them to gardeners and to amateurs.

POLLINIA. Pollen-masses.

POLY. In Greek compounds, this signifies numerous; *e.g.*, Polycotyledonous, having several cotyledons.

POLYACTIDIUM. Included under *Erigeron*.

POLYADELPHIA. A Linnæan artificial order, characterised by having stamens in several phalanges.

POLYALTHIA (from *polys*, much, and *althecis*, healthy; alluding to supposed properties of the plant). ORD. *Anonaceæ*. A genus comprising about thirty species (including twenty-five which are sometimes classed with *Guatteria*) of stove or greenhouse trees or shrubs, natives of tropical Asia, one being Australian. Flowers solitary or fasciculate, axillary or opposite the leaves; sepals three, valvate or rarely loosely imbricate; petals six, bi-seriately valvate, flat, almost equal, ovate or narrow. Leaves oblique, penniveined. The two species described below are the only ones worth mention. They are stove trees. For culture, *see* **Guatteria.**

P. cerasoides (Cherry-like). *fl.*, peduncles axillary, solitary; petals nearly equal. *l.* lanceolate, acute, pubescent beneath. *h.* 60ft. East Indies, 1820.

P. suberosa (corky-barked). *fl.*, three outer petals greenish, the three inner ones whitish; peduncles nearly opposite the leaves, one-flowered. *l.* oblong, acute, smooth. *h.* 30ft. India, 1820.

POLYANDRIA. A Linnæan class, having flowers with an indefinite number of stamens.

POLYANTHES. A synonym of **Polyxena** (which *see*).

POLYANTHUS. A garden race of *Primula*, probably derived from a cross between the Primrose and Cowslip. The Polyanthus has been in cultivation for many years, and has proved itself one of the most popular of florists' flowers. The attention, however, now bestowed on it is much less than at an earlier period of its history, and the varieties raised are far less numerous. Good varieties, that were once procurable, are now lost to cultivation, and those of the present day are not generally considered of equal merit—at least, for exhibition purposes. As a hardy garden plant, the Polyanthus is likely to remain a favourite, and deservedly so, for planting on rockeries, in mixed borders, and in spring flower-beds. The vigorous-growing varieties, which may be readily raised from seed, are admirably adapted for naturalising in pleasure-grounds along the sides of walks, &c. Florists' rules regarding the flowers of a Polyanthus, and the recognised qualities exhibited in them, are very rigid; it is, however, unnecessary to follow them too closely, unless the flowers are required for exhibition. For the last-named purpose, the section known as Gold-laced is most favoured; the

Polyanthus—*continued.*

flowers are distinguished by having a clear, even margin, or lacing, of gold, then a ground or body-colour, similarly well defined, with a stripe passing through the centre of each division to the eye. The pip, as a single flower is termed, should be large, flat, and round, with the exception of five or six small divisions on the margin.

For general garden decoration, any quantity of seedlings with beautiful flowers may be raised without the florists' conventional rules being adhered to. Seeds should be sown in June, or so soon as they are ripe; they germinate quickly at this season, and form flowering plants by the following spring: if kept in store until spring, a season will be lost. In summer, a prepared border outside is best for the seed; in spring, shallow boxes and a free, sandy soil should be used under glass. When once established, Polyanthuses grow in any ordinary garden soil; but they succeed best where it is rich, and the position somewhat moist and partially shaded. It is important that seeds be saved only from the best flowers procurable, or be obtained from a separate reliable source, as the varieties soon deteriorate, even as ornamental plants, if this is not attended to.

Polyanthuses for exhibition are grown in pots and in cold frames, under treatment somewhat similar to that accorded Auriculas. The season for potting or repotting is August, and a good compost would consist of two parts loam to one of leaf mould and decayed manure. A top-dressing of good soil is recommended in February, particularly for plants that have not been repotted the previous autumn. In addition to propagating from seeds, Polyanthuses may be readily increased by divisions. Good varieties grown in pots may have their side-shoots removed when the annual potting takes place in August; and any that are grown in the open ground, can be readily divided in the autumn, when they are planted out.

Besides the Gold-laced varieties of Polyanthus already referred to, there are others designated respectively Fancy and Hose-in-Hose. Fancy varieties are of various hues, the plants being very floriferous, and of vigorous habit; and some of the Hose-in-Hose flowers are curious and very uncommon. All succeed under similar treatment.

POLYANTHUS. *See* **Polianthes.**

POLYANTHUS NARCISSUS. *See* **Narcissus Tazetta.**

POLYBÆA. A synonym of **Cavendishia** (which *see* under **Proclesia**).

POLYBOTRYA. Included under **Acrostichum** (which *see*).

FIG. 223. POLYCALYMMA STUARTII, showing Habit, detached Flower-head, and Leaf.

POLYCALYMMA (from *poly*, many, and *kalymna*, a covering; in allusion to the numerous series of involucral bracts). ORD. *Compositæ*. A monotypic genus, now included, by Bentham and Hooker, under *Myriocephalus*. The species is a glandular-puberulous, half-hardy, perennial herb, requiring similar treatment to **Centaurea** (which *see*).

P. Stuartii (Stuart's). *fl.-heads* white, depressed-hemispherical, 1in. or more in diameter; florets many, ½in. long; outer involucral leaflets ½in. long. *l.* alternate, sessile, elongated-linear, flat, 3in. to 4in. long, ½in. broad; uppermost ones scarious, white. Stems fistular, striated, 1ft. or more long. Australia. See Fig. 223.

POLYCAMPIUM. Included under **Polypodium** (which *see*).

POLYCARPÆA (from *poly*, many, and *karpos*, a fruit; alluding to the numerous seeds). SYNS. *Hagæa, Lahaya, Mollia, Polycarpia*. ORD. *Caryophylleæ*. A genus comprising about two dozen species of greenhouse or hardy, annual or perennial, erect or rarely diffuse herbs, natives of tropical and extra-tropical regions, one being broadly dispersed over tropical America. Flowers often numerous, disposed in terminal, paniculate, effuse or contracted, sometimes capitate cymes; sepals five, white, rose, or purple, scarious; petals five, entire, bidentate, or rarely laterally denticulate. Leaves narrow-linear or rarely ovate, fasciculate, often pseudo-verticillate. The species are of easy culture in light, sandy loam. The annuals may be increased by seeds, sown on a hotbed, or in the open border, in spring; and the perennials by cuttings. The species are not much known to cultivation; those mentioned below are hardy.

P. aristata (awned). *fl.* white, in corymbose cymes. June and July. *l.* usually six in a whorl, linear-lanceolate; young ones silky, mucronated by an awn; old ones nearly glabrous, and almost awnless. *h.* 3in. to 6in. Canary Islands, 1780. Perennial.

P. gnaphalioides (Gnaphalium-like). *fl.* white, crowded into terminal, sub-capitate cymes. June and July. *l.* oblong, hoary-tomentose. Stems suffruticose, prostrate. North Africa, 1818. Perennial.

P. latifolia (broad-leaved). *fl.* white; cymes terminal, corymbosely capitate. June to August. *l.* obovate, mucronated by an awn; cauline ones usually six in a whorl, those of the branches opposite. Stems suffruticose, diffuse. *h.* 3in. Teneriffe, 1810. Perennial.

P. Memphitica (Memphitic). *fl.* white; petals quite entire; cymes terminal, few-flowered. July. *l.* usually six in a whorl, oval-oblong, narrowed into the petiole. Stems diffuse, branched, villous. *h.* 6in. Egypt, 1828. Annual.

POLYCARPA MAXIMOWICZII. A synonym of **Idesia polycarpa** (which *see*).

POLYCARPIA. A synonym of **Polycarpæa** (which *see*).

POLYCARPIC. Many-fruited; also, but less properly, fruiting many times.

POLYCHILOS. Included under **Phalænopsis** (which *see*).

POLYCYCNIS (from *polys*, many, and *kyknos*, a swan; referring to the lip and column, which, together, bear some resemblance to a swan). ORD. *Orchideæ*. A genus comprising about five species of stove, epiphytal orchids, closely allied to *Cycnoches* and *Mormodes*, natives of tropical America. Flowers rather large, pedicellate, in loose, floribund, often nodding racemes; sepals free, spreading, narrow; petals similar, or narrow and substipitate at base; lip affixed to the base of the column, sometimes biauriculate; column very long, slender, curved, resembling the neck of a swan. Leaves ample, plicate-venose, contracted into petioles. Rhizomes or scapes erect, few-sheathed, simple. For culture, *see* **Catasetum.**

P. barbata (bearded). This is correct name of plant described in this work as *Cycnoches barbatum*.

P. gratiosa (agreeable). *fl.* brownish-purple; raceme deflexed, drooping, many-flowered. Costa Rica, 1871. "This is a species in the way of *P. lepida*; yet it appears very distinct by the very short claw of the lip and the anterior part of the same organ" (Reichenbach). An elegant plant.

Polycycnis—*continued.*

P. lepida (neat). *fl.*, sepals and petals light brown, slightly tipped with yellow at the apex; lip light yellow, spotted with chocolate-brown, and white towards the apex; raceme drooping, from fifteen to twenty-flowered. Pseudo-bulbs about 2in. high, tapering, dark green. Columbia, 1870. A very pretty species. (I. H. ser. iii. 19.)

P. muscifera (fly-bearing). This is the correct name of plant described in this work as *Cycnoches musciferum.*

P. vittata (striped). *fl.* yellow, streaked with so much deep chocolate that the former colour is scarcely discernible on the lip, disposed in an erect raceme. *h.* 1ft. British Guiana, 1841. (B. R. 1841, 69, under name of *Houlletia vittata.*)

POLYDESMUS COMPLANATUS. *See* **Millipedes and Myriapoda.**

POLYGALA (the old Greek name used by Dioscorides, from *polys*, much, and *gala*, milk; in reference to its reputed quality of promoting the secretion of milk). Milkseed; Milkwort. Including *Chamæbuxus*, *Isolophus*, and *Senega*. ORD. *Polygaleæ*. An extensive genus (200 species have been described) of greenhouse or hardy, annual or perennial herbs, shrubs, or sub-shrubs, distributed over the temperate and warmer regions of the globe. Flowers sometimes showy, small, variable in colour; spikes or racemes terminal or lateral, rarely axillary, sometimes in contracted heads, rarely paniculate. Leaves alternate, or rarely opposite or verticillate. Only a comparative few of the species are now in cultivation. The hardy sorts are desirable subjects for borders and rockwork. The greenhouse species are fine and very distinct plants amongst the hard-wooded section. They are more easily grown than most others, and flower profusely each spring. Fibrous peat, with some silver sand intermixed, forms a suitable compost for Polygalas, which should be potted firm. Propagated, in spring, by cuttings of the young shoots, taken when about 3in. long, inserted in sandy peat, under a bell glass, placed in an intermediate temperature, and kept shaded.

P. Chamæbuxus (dwarf Box). Bastard Box. *fl.* cream-coloured or yellow, tipped with purple, fragrant; racemes axillary, few-flowered. Early summer. *l.* oblong-lanceolate, mucronate. Stem shrubby, branched, procumbent. *h.* 6in. Mountain woods in many parts of Europe, 1658. A very pretty, neat-habited, hardy sub-shrub. (B. M. 316.) *P. C. purpurea* is a handsome variety, dark brown, with purplish leaves. (Gn., Jan., 1878.)

P. Hilairiana (St. Hilaire's). *fl.* the largest of the genus; three outer sepals small, ovate; two inner ones corolloid, white, tinged with green and black; inner petals mostly combined into a tube, white; lateral ones sub-acute, rose-coloured at the apex; racemes six to ten-flowered. Spring. *l.* 4in. to 5in. long, oblong-ovate, sub-acute. Stem unbranched, erect, 1ft. high. Bahia. Greenhouse shrub. (B. M. 5.57.)

P. myrtifolia grandiflora (Myrtle-leaved, large-flowered).* *fl.* rich purple; wings obliquely and broadly obovate; keel large, veiny; pedicels shorter than the flowers. April and May. *l.* on very short petioles, oblong or oblong-obovate, somewhat mucronate. *h.* 4ft. to 6ft. South Africa. A much-branched, greenhouse shrub. (B. M. 3616.) *P. Dalmaisiana* of gardens, a popular greenhouse plant, is either a form of *P. myrtifolia*, or a hybrid between it and *P. oppositifolia.*

P. oppositifolia (opposite-leaved).* *fl.* purplish, with a yellowish-green keel, in terminal, sub-corymbose racemes. *l.* opposite, cordate, ovate, acute. *h.* 3ft. to 4ft. Cape of Good Hope, 1790. Greenhouse shrub. (B. R. 636.)

P. o. cordata (heart-shape-leaved). *l.* broadly cordate, acute or acuminate. *h.* 3ft. Cape of Good Hope, 1791.

P. o. latifolia (broad-leaved). *l.* broadly ovate, cuspidate-acuminate. (B. R. 645.)

P. paucifolia (few-leaved). *fl.* of a fine purple colour, large, in threes, terminal, the keel crested. May to August. *l.* ovate. Stems very simple, erect, naked below. *h.* 3in. North America, 1812. Hardy herbaceous perennial. (B. M. 2852.)

P. Senega. Seneca Snake-root. *fl.* almost sessile; wings round-obovate, concave; crest short. May and June. *l.* lanceolate or oblong-lanceolate, with rough margins. Stems several, from thick and hard, knotty rootstocks, simple, 6in. to 12in. high. North America. Hardy perennial herb. (B. M. 1051; B. M. Pl. 29; L. B. C. 1380.)

P. virgata (twiggy). *fl.* purple or flesh-coloured, in long racemes. *l.* scattered, lanceolate or linear-lanceolate. Cape of Good Hope. Greenhouse shrub.

P. v. speciosa (showy). *fl.* purplish, with spreading pedicels, in loose racemes. May to October *l.* oblong-cuneate, obtuse, mucronate, upper ones linear, and, as well as the twiggy branches, glabrous. *h.* 6ft. Cape of Good Hope, 1814. A showy, greenhouse shrub. (B. M. 1780.)

Polygala—*continued.*

P. vulgaris (common). Common Milkwort; Procession Flower; Rogation Flower. *fl.* varying in colour, blue, lilac, purple, pink, or white, about ½in. long, in terminal racemes. June. *l.* small, oblong or lanceolate, glabrous Stems prostrate or erect, numerous, slender. Europe, &c. (Britain). Perennial herb. (Sy. En. B. 185.)

POLYGALEÆ. A natural order of herbs or under-shrubs, occasionally twining, or erect or climbing shrubs, rarely small trees, glabrous, tomentose or villous, dispersed over the temperate and warmer regions of the globe. Flowers hermaphrodite, irregular, solitary or centripetally spicate or racemose, rarely paniculate, axillary or terminal; sepals five, free, closely imbricated, the two inner ones larger, petaloid, wing-formed; petals three or five, hypogynous, the two lateral free or united at their base with the lower concave or galeate (keel), in the gamopetalous corolla split behind, rarely absent; upper two sometimes equal to the lateral, enveloping the keel in æstivation, sometimes small, scale-like, or absent; stamens eight, rarely five or four, above the middle monadelphous or rarely free, the outer ones often more or less connate with the petals; pedicels usually articulate at base, bracteate and bracteolate. Fruit a capsule, berry, or drupe. Leaves alternate or rarely opposite, simple, entire; stipules none. The species contain tonic and astringent properties. Several of the European Polygalas find a place in our Materia Medica as remedies for lung diseases; the root of *P. Senega* has a stimulating action on the pulmonary mucous membrane. The order includes fifteen genera and about 400 species. Illustrative genera are: *Monnina*, *Muraltia*, and *Polygala.*

POLYGONASTRUM. A synonym of **Smilacina** (which *see*).

POLYGONATUM (the old Greek name, used by Dioscorides, from *poly*, many, and *gonu*, a knee-joint; alluding to the numerously-jointed stem). Solomon's Seal. SYNS. *Axillaria*, *Evallaria.* ORD. *Liliaceæ.* A genus comprising (according to Mr. Baker) twenty-three species of pretty, mostly hardy, herbaceous, border plants, broadly dispersed over North temperate regions. Flowers nodding or pendulous, solitary in the axils, or frequently shortly and loosely racemose or sub-umbellate, on short peduncles; perianth marcescent, at length deciduous, with short, erecto-patent

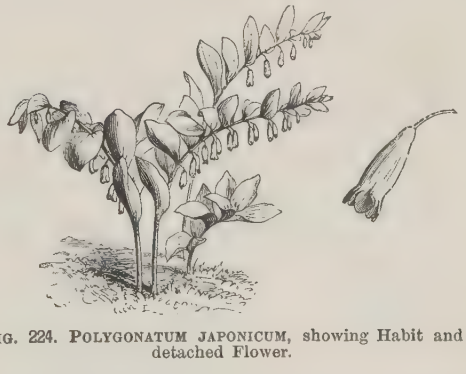


FIG. 224. POLYGONATUM JAPONICUM, showing Habit and detached Flower.

lobes. Berry globose, pulpy. Leaves alternate, opposite, or whorled, ovate, lanceolate, or linear, in one species shortly cirrhose-acuminate at apex. The species, the best known of which are here described, are of very easy culture in a moderately good, loamy soil. They are all hardy, except where otherwise stated, and are admirably adapted for naturalising in woods and copses. *P. multiflorum*, the common Solomon's Seal, is a fine subject for forcing. The plants may be grown in the open ground all

Polygonatum—*continued.*

summer, and potted-up ready for forcing after the stems die down. The large, fleshy rootstocks may be placed rather thickly in 6in. pots, and, after flowering is over, transferred again to the open ground. Large quantities of Solomon's Seal are annually imported purposely for forcing; but it may be prepared at home, by providing a good soil, and planting each year according to the quantity required. Propagated easily by divisions.

P. biflorum (two-flowered).* *fl.*, perianth greenish, ½in long; peduncles one to three, but mostly two, flowered. May. *l.* ovate- or lanceolate-oblong, nearly sessile, usually minutely pubescent, at least on the veins, pale or glaucous beneath. Stem slender, 1ft. to 3ft. high. North America.

P. japonicum (Japanese). *fl.* one to three in the axils, drooping; perianth ½in. to ⅔in. long, with a white tube and green, deltoid teeth. April. *l.* ten to twelve, alternate, ascending, oblong, 2in. to 3in. long, acute, above obscurely glaucous, below distinctly so. Stem 1ft. to 1½ft. high. Japan. See Fig. 224

FIG. 225. POLYGONATUM MULTIFLORUM, showing Habit and detached Raceme.

P. multiflorum (many-flowered).* Common Solomon's Seal; David's Harp; Lady's Seal. *fl.* white; perianth about eight lines long, constricted in the middle; peduncles two to five-flowered. June. *fr.* bluish-black. *l.* alternate, 3in. to 5in. long, with very short petioles, oblong, stem-clasping. Stem 2ft. to 3ft. high, terete. Northern hemisphere (Britain). See Fig. 225. SYN. *Convallaria multiflora* (F. D. 152). There are two or three varieties of this very pretty plant; one, *flore-pleno*, has double flowers, and another, *striatum*, variegated leaves.

P. officinale (officinal). *fl.* white, having the perianth constricted at the base. *fr.* dark violet. *l.* ten to twelve, alternate, oblong, semi-amplexicaul. Stems about 1ft. high, angular. Northern hemisphere (Britain). SYNS. *P. vulgare, Convallaria Polygonatum* (F. D. 377).

P. o. macranthum (large-flowered). A very large-flowered form. *h.* 1ft. to 1½ft. Japan. (B. M. 6133.)

P. oppositifolium (opposite-leaved). *fl.* many, disposed in opposite corymbs; perianth tube white, beautifully ribbed with red; segments greenish; peduncles four- to ten-flowered. April. *fr.* scarlet. *l.* ten to twenty or more, oblong, acuminate, very shortly petiolate, all opposite. Stems 2ft. to 4ft. high. Himalayas, 1822. Greenhouse. (B. M. 3529, H. E. F. 125, and L. B. C. 610, under name of *Convallaria oppositifolia.*) The form *albo-vittatum* has red stems, and leaves striped with white.

P. punctatum (dotted). *fl.*, perianth tube white, lilac-dotted; segments greenish. May. *l.* twelve to twenty, ascendent, all opposite, rarely alternate, oblong-lanceolate, 2in. to 3in. long, cuneate at base, shortly petiolate, rigid. Stems 1ft. to 2ft. high, angular, sulcate. India, 1857. (B. M. 5061.)

P. roseum (rosy). *fl.* rose-colour, twin in the axils, on very short pedicels; perianth nearly ½in. long, with a cylindrical tube and short teeth. May. *l.* ascendent, linear or lanceolate, acuminate, sub-petiolate, 3in. to 5in. long; upper ones opposite or ternate; those at the tips of the stems whorled. Stems 2ft. to 3ft. high, sulcate. Central Siberia. (B. M. 5049.)

P. verticillatum (whorled). *fl.* greenish, rather smaller than those of *P. multiflorum*; perianth constricted in the middle; peduncle one to three-flowered. June. *fr.* red. *l.* whorled, sessile, lanceolate. Stem 2ft. to 4ft. high, angular. Northern hemisphere (Britain). SYN. *Convallaria verticillata* (F. D. 86).

P. vulgare (common). A synonym of *P. officinale.*

POLYGONEÆ. A very distinct natural order of herbs, shrubs, or sometimes trees, broadly dispersed; the arborescent species are nearly all tropical American,

Polygoneæ—*continued.*

the shrubs are mostly limited to the Eastern Mediterranean or Western Asiatic region, and the herbaceous kinds affect temperate and mountainous regions. Flowers hermaphrodite, or, in a few genera, unisexual, regular, usually rather small, springing from the axils of leaves or bracts (sometimes ochreiform), solitary or fasciculate, in racemes or spikes; perianth inferior, calycine or coloured, with four to six lobes or segments; stamens six to nine, rarely fewer, or many and indefinite; filaments filiform or dilated at base, free or connate in a ring at the base; anthers two-celled, often versatile; ovary trigonal or compressed, sessile or shortly adnate to the perianth at the base; pedicels frequently articulated. Fruit a nut, trigonal, compressed, or rarely quadrigonal, rarely naked, usually covered by the perianth. Leaves alternate or rarely opposite, variable in form, rarely lobed or divided; petioles usually more or less dilated and stem-clasping. One of the most important products of the order is Rhubarb (*Rheum officinale*). Buckwheat, Sorrels, and Docks may be mentioned as other economic members of the order. *Polygoneæ* comprises thirty genera and about 600 species. Examples are: *Coccoloba, Fagopyrum, Muehlenbeckia, Polygonum,* and *Rheum.*

FIG. 226. UPPER PORTION OF STEM OF POLYGONUM CUSPIDATUM.

POLYGONUM (from *polys*, many, and *gonu*, a knee-joint; referring to the numerous joints of the stem). Knot Grass or Weed. ORD. *Polygoneæ*. A very large genus (nearly 150 species) of handsome, annual or perennial, greenhouse or hardy herbs or (rarely) under-shrubs, of variable habit, found throughout the world, but rare within the tropics. Flowers usually fasciculate, sometimes so lax that they may be regarded as axillary; perianth funnel-shaped or campanulate, usually coloured, with five somewhat unequal segments; pedicels articulated above or below the middle. Leaves alternate, with ochreate stipules. A great number of the species, twelve

FIG. 227. POLYGONUM ORIENTALE, showing Habit, detached Spike, and Single Flower.

of which are British, are of no ornamental value whatever, but the following are desirable and worth growing. They are of the easiest possible culture in any ordinary garden soil, but they well repay generous treatment and a good position. *P. cuspidatum* and *P. sachalinense* are specially noteworthy and fine amongst hardy plants where space is allowed them to develop. The annuals are raised from seeds, sown in the open border, in spring, or raised in heat, and afterwards planted out. This latter plan is the best with such species as *P. orientale*, which, in a warm, sunny spot, in good, rich soil, forms a very fine plant. The perennials are increased by dividing the root-stocks.

P. affine (kindred).* *fl.* rosy-red, in dense spikes, freely produced throughout the autumn. *l.* few and narrow. *h.* 6in. to 8in. Nepaul, 1822. A very ornamental, hardy perennial. (B. M. 6472.) SYN. *P. Brunonis* (L. J. F. 117; L. & P. F. G. 37).

P. alpinum (alpine). *fl.* snow-white, panicled. Summer. *l.* ovate-lanceolate, deep green, with ciliated margins. *h.* 3ft. to 4ft. Alps, 1816. This very desirable perennial is particularly useful where cut flowers are much in request.

P. amphibium (amphibious). Willow Grass. *fl.* bright red, in dense, ovate spikes. July. *l.* lanceolate. Stem round, leafy. North temperate and Arctic regions (Britain). An aquatic or semi-aquatic perennial herb. When growing in water, the petioles are very long and the stipules smooth; whilst the terrestrial form has short petioles and hispid stipules. (Sy. En. B. 1242.)

Polygonum—*continued.*

P. amplexicaule (stem-clasping).* *fl.* bright rose-red or white, in solitary or twin racemes 2in. to 6in. long. September and October. *l.* cordate-ovate or cordate-lanceolate, long-acuminate, the lower long-petioled, the upper sessile and amplexicaul. Stems 2ft. to 3ft. high, from a strong, woody root-stock. Himalayas. Hardy perennial herb. (B. M. 6500.)

P. Bistorta. Bistort or Snakeweed. *fl.* reddish-pink, in a dense, terminal, erect, solitary spike. June to September. *l.* chiefly radical, large, oblong or ovate-obtuse, glaucous beneath, on long petioles. *h.* 1½ft. Europe (Britain), North and West Asia. Perennial herb. (Sy. En. B. 1243.)

P. Brunonis (Brown's). A synonym of *P. affine*.

P. capitatum (headed). *fl.* pink, small, growing in dense, round heads, on long stalks, from the upper leaf axils. *l.* ovate or elliptical, 2in. long, green, marked with dark V-shaped bands, extending from the midrib at the centre to the base of the leaf. Stems slender, diffuse, hairy, rooting. North India. A pretty little, cool greenhouse or half-hardy, perennial herb, with a neat, spreading habit. (Ref. B. 11.)

P. chinense foliis-pictis (painted-leaved Chinese). *l.*, some green, others purple, and all with a V-shaped mark, margined on the inside with a dark line of deep purple or blackish-green. China to India, &c. Hardy perennial herb. (B. M. 5238.)

P. compactum (compact).* *fl.* white, in erect racemes. September. *l.* somewhat crimped. *h.* 2ft. Japan, before 1875. This is probably a variety of *P. cuspidatum*; but it is very distinct in the way implied by its name, being more compact and rigid, and not more than half so tall. The leaves, too, are of a much darker colour. Its habit is, however, less graceful than that of *P. cuspidatum*. Hardy perennial herb. (B. M. 6476.)

P. cuspidatum (pointed-leaved).* *fl.* creamy-white, forming drooping, feathery panicles, 4in. to 5in. long, succeeded by scarlet fruits. Summer. *l.* large, somewhat distichous, oval-oblong, cuspidate, petiolate. *h.* 4ft. to 8ft. Japan, 1825. A hardy perennial herb, of quick growth, and having long, slender stems. It is best grown as an isolated specimen. See Fig. 226. (B. M. 6503; L. & P. F. G. i., p. 137; R. G. 291.) SYN. *P. Sieboldii* (of gardens).

P. filiforme variegatum (thread-like, variegated).* *l.* large, drooping, oval-oblong, finely splashed or marbled with pale green and yellow. Japan, 1865. A hardy perennial, fine for sub-tropical gardening.

P. orientale (Eastern).* *fl.* deep rosy-purple or white, in long, drooping racemes, which are both terminal and axillary. August. *l.* large, ovate-acuminate, pilose or nearly glabrous. *h.* 3ft. to 4ft., or sometimes nearly 10ft. East Indies, 1707. A large and free-growing, hardy annual, with very robust stems, which give off numerous, lateral shoots. See Fig. 227. (B. M. 213.)

P. sachalinense (Sachalin).* *fl.* of a delicate greenish-yellow colour, in axillary racemes; bracts ovate, long-pointed. Late summer. *l.* broadly ovate or ovate-oblong, acuminate, the lower

FIG. 228. POLYGONUM SACHALINENSE.

Polygonum—*continued.*

ones sub-cordate at the base, upper ones truncate, all with glaucous and prominently-veined under-surfaces. Stem erect, strong. *h.* 10ft. to 12ft. Sachalin Islands, 1869. A strong-growing, hardy perennial, differing chiefly from *P. cuspidatum* in its angular, striated stems. This plant luxuriates in a moist subsoil near the margin of water, and is a desirable subject for naturalising in semi-wild places. See Fig. 228. (B. M. 6540.)

P. Sieboldii (Siebold's). A garden synonym of *P. cuspidatum.*

P. sphærostachyum (round-spiked).* *fl.* blood-red, pendulous, in a broad, cylindric, globose spike. Autumn. *l.* 3in. to 5in. long, linear, linear-oblong, or lanceolate, acute, crispidate crenulate, glabrous and glaucous or pubescent beneath; radical ones stalked, cauline ones sessile. Alpine and sub-alpine Himalaya. Hardy. (B. M. 6847.)

P. tomentosum (tomentose). *fl.* clear rosy-pink, in erect, spike-formed panicles at the tips of the branches. *l.* large, oblong-lanceolate, very much attenuated at the apex, covered on both surfaces, but especially beneath, with greyish hairs. India, 1876. A half-hardy or greenhouse perennial. (R. G. 810.)

P. vaccinifolium (Whortleberry-leaved).* *fl.* bright rose, freely produced in long, nearly round spikes. Late summer and autumn. *l.* smooth, ovate or elliptic, attenuated at both ends, the margin slightly revolute, bright green, sometimes tinged with red above, pale beneath. Stems much-branching, woody, prostrate. Himalaya, 1845. A hardy perennial, one of the most useful plants for rockwork in cultivation. (B. M. 4622.)

POLYMNIA (dedicated to the muse Polyhymnia, for no obvious reason, the species being coarse and inelegant). Leaf-cup. ORD. *Compositæ.* A genus comprising about a dozen species of greenhouse or hardy, glabrous, scabrous-pubescent or villous, often slightly viscid, perennial herbs, shrubs, or trees, natives of America, from Bonaria to Canada. Flower-heads yellow or yellowish, heterogamous, rather large, mediocre, or small, corymbosely paniculate; achenes glabrous; involucre hemispherical or expanded, with two-seriate

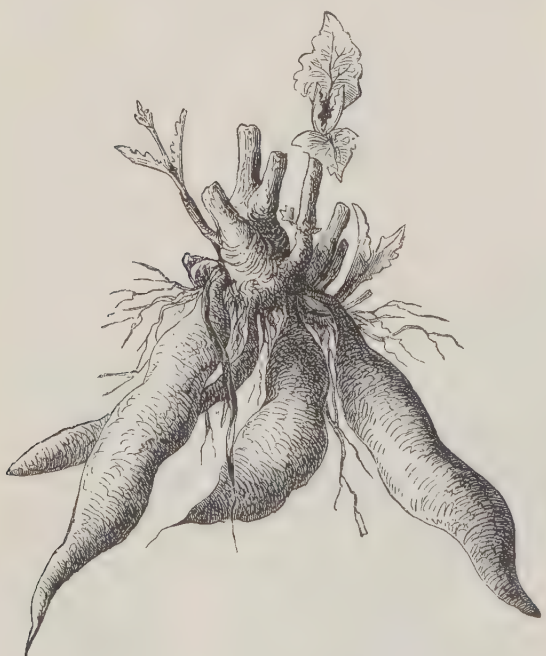


FIG. 229. TUBERS OF POLYMNIA EDULIS.

bracts; receptacle flat. Leaves opposite, or the upper ones alternate, often ample, entire, angulate, or lobed. The species best known to cultivation are described below. They are very useful for sub-tropical gardening in the South of England. A warm position and deep, rich soil are essential elements in their culture. Propagated freely, in spring, by divisions; by cuttings, struck in sand, in a gentle heat, during January; or by seeds, sown in heat, at the same time.

Polymnia—*continued.*

P. canadensis (Canadian). *fl.-heads* whitish-yellow, small; rays few, obovate or wedge-shaped, shorter than the involucre. July. *l.*, lower ones deeply pinnatifid, the uppermost ones triangular-ovate, and three to five-lobed or angled, petioled. *h.* 6ft. North America, 1768. Hardy herbaceous perennial.

P. edulis (edible). *fl.-heads* yellow. A tall, coarse-growing, hardy perennial, cultivated in the Andean region for the sake of its edible tubers. See Fig. 229.

P. grandis (large). A synonym of *Montanoa bipinnatifida.*

P. heracleifolia (Heracleum-leaved). A synonym of *Montanoa bipinnatifida.*

P. pyramidalis (pyramidal). *fl.-heads* having a yellow ray and a dark brown disk, disposed in cymes. Summer and autumn. *l.* cordate-ovate, 12in. long by 16in. broad, with decurrent petioles. *h.* 10ft. A free and rapid-growing, half-hardy, arborescent perennial, something like the Sunflower in habit. New Grenada, 1867. (R. H. 1867, 210.)

P. Uvedalia (Uvedalia). *fl.-heads* yellow; rays ten to fifteen, linear-oblong, much longer than the inner scales of the involucre; outer involucral scales very large. September. *l.* broadly ovate, angled and toothed, nearly sessile; lower ones palmately lobed abruptly narrowed into a winged petiole. *h.* 4ft. to 10ft. United States, 1699. Hardy herbaceous perennial.

POLYPARA. A synonym of **Houttuynia** (which *see*).

POLYPETALOUS. Having petals perfectly distinct.

POLYPHEMA. A synonym of *Artocarpus.*

POLYPODIUM (the old Greek name, used by Theophrastus, from *polys*, many, and *podion*, a little foot; on account of the appearance of the rhizome and its appendages). Polypody. Including *Aglaomorpha, Calymmodon, Campyloneuron, Colysis, Craspedaria, Cryptosorus, Cyrtomiphlebium, Dibblemma, Dictymia, Dictyopteris, Drynaria, Dryostachyum, Goniophlebium, Goniopteris, Grammitis* (in part), *Lecanopteris, Lepicystis, Lopholepis, Microgramme, Microsorium* (in part), *Monachosorum, Niphobolus, Niphopsis, Paragramma, Phegopteris, Phlebodium, Phymatodes, Pleopeltis, Pleuridium, Polycampium, Pseudathyrium,* and some other less important so-called genera. ORD. *Filices.* The largest genus of the order, comprising upwards of 450 species. It includes plants of two different modes of growth, each series comprising a number of species of each of the different kinds of venation, and from all climates. Sori on the back of the lobes, round or rarely oblong, not more than twice as long as broad. Polypodiums are very handsome plants; they thrive under very varied conditions. Many of them, perhaps, do best in good fibrous loam and soil rich in humus; others thrive on blocks of fibry peat, on tree-fern stems, or treated as basket-plants. Some of them are eminently adapted for crevices on rockwork. Except where otherwise stated, the species described below thrive under stove treatment. For general culture, &c., *see* **Ferns.**

P. acrostichoides (Acrostichum-like). *rhiz.* woody, wide-creeping, scaly, black in the centre. *sti.* 1in. to 3in. long, firm, erect. *fronds* 1ft. to 2ft. long, ½in. to 1in. broad, ligulate, gradually narrowed below, naked above, dirty-white-tomentose beneath. *sori* bright-coloured, not immersed, small, close, covering the whole upper part of the frond. Ceylon, Queensland, &c. Greenhouse. SYN. *Niphobolus acrostichoides.*

P. adnascens (adnascent). *rhiz.* slender, firm, with linear, deciduous scales. *sti.* ½in. to 1in. long, firm, erect. *fronds* dimorphous; the barren ones elliptical or spathulate, blunt; the fertile ones longer and narrower, 6in. to 12in. long, ½in. to ¾in. broad, naked above, white-tomentose beneath. *sori* bright-coloured, small, immersed, occupying the whole of the contracted upper part of the frond. India, &c., 1824. SYN. *Niphobolus adnascens* (H. G. F. 19).

P. adnatum (adhering). *sti.* 6in. to 12in. long, naked, glossy. *fronds* 1½ft. to 3ft. long, 1ft. broad, with an oblong-lanceolate, entire fertile pinna, 6in. to 9in. long, and 1½in. to 2in. broad, and several similar lateral ones on each side, the upper ones broadly adnate to the rachis at the base. *sori* and *areolæ* in rows of four to six between the midrib and edge. Guatemala, &c. SYN. *Goniophlebium adnatum.*

P. albo-punctatissimum (much dotted with white). A variety of *P. crassifolium.*

P. albo-squamatum (white-scaly).* *rhiz.* woody, with dark brown scales, sometimes 1in. long. *sti.* 6in. to 12in. long, firm, erect, glossy. *fronds* sometimes simple, usually pinnate, 1ft. to

Polypodium—*continued.*

2ft. long, 1ft. or more broad, with several distant, erecto-patent pinnæ on each side, which are 6in. to 10in. long, and ½in. to ¾in. broad, the apex acuminate, the edge slightly repand towards the point, the base narrowed, the lower ones stalked; upper surface with small, white dots at the edge or all over. *sori* in a single row midway between the edge and midrib. Malay Isles and Philippines. (H. G. F. 47.) SYN. *Phymatodes albo-squamata.*

P. alpestre (alpine). *sti.* 4in. to 6in. long, tufted, scaly below. *fronds* 1ft. to 2ft. long, 6in. to 8in. broad, oblong-lanceolate; pinnæ lanceolate, 3in. to 4in. long, 1in. to 1½in. broad; pinnules deeply pinnatifid, with toothed lobes. *sori* small, one to four to each lobe. Cold regions of Northern hemisphere (Britain, &c.). This species closely resembles *Asplenium Filix-fœmina.* SYN. *Pseudathyrium alpestre.*

P. a. flexile (pliable). A variety of more flaccid habit; the pinnules oblong, with fewer lobes, and a broad, uncut centre. SYN. *Pseudathyrium flexile.*

P. amphostemon. A form of *P. angustifolium.*

P. androgynum (hermaphrodite). *sti.* 1ft. to 2ft. long, erect, naked or slightly villous. *fronds* 1ft. to 3ft. long, 1ft. or more broad; pinnæ 6in. to 8in. long, ½in. to 1in. broad, numerous, spreading, lowest narrowed at base and sometimes stalked, cut a quarter to half way down into blunt lobes; rachis and under side sometimes slightly hairy. *sori* in rows near the midrib. Cuba to Peru, 1843. SYNS. *P. tetragonum, Goniopteris tetragona.* In the form *megalodus*, the pinnæ are 1½in. and the lobes ¼in. broad, the latter sub-falcate.

FIG. 230. POLYPODIUM ANGUSTATUM.

P. angustatum (narrowed). *rhiz.* stout, wide-creeping, clothed with whitish, linear, deciduous scales. *sti.* 2in. to 4in. long, strong, erect. *fronds* 6in. to 12in. long, ½in. to 1½in. broad, ligulate, entire, very coriaceous; upper surface naked, the lower clothed with adpressed, cottony, sub-ferruginous tomentum. *sori* large, prominent, in rows near the edge of the contracted upper part, and sometimes confluent. North India, New South Wales, &c. Greenhouse. See Fig. 230. (H. G. F. 20.)

P. angustatum (narrow), of Blume. A synonym of *P. palmatum.*

P. angustifolium (narrow-fronded). *rhiz.* stout, epigæous, brown-scaly. *fronds* 1ft. to 1½ft. long, only ½in. broad, quite entire, with an acute point; the lower part gradually narrowed into a generally short stem; edges often revolute. *sori* and *areolæ* in from one to four rows between the midrib and edge; the former in two rows between the main veins. Cuba, Brazil, &c., 1820. SYN. *Campyloneurum angustifolium.* A very variable species. The broadest form, *amphostemon*, has fronds 1in. broad, with four rows of sori; the variety *ensifolium* has narrow, sessile fronds, with the areolæ and sori in one row between the edge and midrib.

P. argutum (pungent). *rhiz.* ⅛in. thick, firm, wide-creeping, with minute, dark brown scales. *sti.* 3in. to 6in. long, naked, castaneo-stramineous. *fronds* oblong-lanceolate, sub-erect, 1ft. to 2ft. long, 8in. to 12in. broad, simply pinnate; pinnæ ten to twenty-jugate, ligulate, acuminate, faintly inciso-crenate, ½in. to ¾in. broad, many free and distant, the lowest not reduced. *sori* and *areolæ* uniserial, the former not close, nearer the midrib than the edge. Himalayas, 1843. Greenhouse.

P. asperulum (rather rough). *sti.* brownish, firm, terete, pubescent. *fronds* 1½ft. to 2ft. long, 1ft. or more broad lower

Polypodium—*continued.*

pinnæ 6in. to 9in. long, ½in. broad, unequal-sided, cut down to the rachis below into oblong, pinnatifid segments; both surfaces villous. *sori* copious, one to each ultimate lobe. Philippines, 1842. SYN. *Phegopteris asperula.*

P. asplenioides (Asplenium-like). A variety of *P. reptans.*

P. attenuatum (thin), of Robert Brown. A synonym of *P. Brownii.*

P. aureum (golden).* *rhiz.* stout, wide-creeping, clothed with bright, ferruginous scales. *sti.* 1ft. to 2ft. long, stout, erect, glossy. *fronds* 3ft. to 5ft. long, 9in. to 18in. broad, with a long, linear-lanceolate, terminal lobe, and cut throughout within about ½in. of the rachis into numerous, undulated, lateral pinnæ, 4in. to 9in. long, about 1in. broad, with a rounded sinus between. *sori* irregularly one to three-seriate. *areolæ* copious. Tropical America and Australia, 1742. SYN. *Phlebodium aureum.*

P. a. areolatum (areolate). A variety with smaller, more coriaceous, and very glaucous fronds, closer lobes, and uniserial sori. SYNS. *P. sporadocarpum, Phlebodium areolatum.*

P. a. pulvinatum (cushion-like). This resembles *P. a. areolatum*, but the fronds are hardly at all glaucous, and the terminal lobe is very small. SYN. *Phlebodium pulvinatum.*

P. auriculatum (eared). *sti.* tufted, 1½ft. to 2ft. long, deciduously villous. *fronds* 3ft. to 4ft. long, 1ft. or more broad; pinnæ 6in. to 8in. long, 1in. broad, cut down nearly to the rachis into close, spreading, entire, blunt lobes; lower pinnæ reduced to mere auricles, furnished with a prominent gland at the base beneath. *sori* borne about the middle of the veinlets. Himalayas, 1824.

P. bifrons (two-fronded). *rhiz.* woody, slender, branched, tortuous, nearly naked. *fronds*, barren ones 3in. to 4in. long, 1in. broad, sessile, elliptical, narrowed at both ends, with blunt lobes, reaching nearly half way down; fertile ones 4in. to 6in. long, about ½in. broad, entire, short-stalked. *sori* large, oblong, placed end to end in a row on each side, close to the midrib. Ecuador. SYN. *Phymatodes bifrons.*

P. Billardieri (La Billardière's). *rhiz.* woody, wide-creeping, with scales black in the centre. *sti.* 4in. to 8in. long, firm, erect, glossy. *fronds* varying from oblong-lanceolate and quite entire to 18in. long and 9in. broad, deeply pinnatifid, with lanceolate or linear lobes. *sori* large, uniseriate, medial or sub-marginal, distinctly immersed. South Australia, &c., 1823. Greenhouse. SYN. *Phymatodes Billardieri.*

P. biserratum (twice-serrated). A form of *P. subpetiolatum.*

FIG. 231. PINNA OF POLYPODIUM BRASILIENSE.

P. brasiliense (Brazilian). *rhiz.* stout, with grey scales. *sti.* 6in. to 12in. long, firm, erect, glossy. *fronds* 1ft. to 2ft. long, frequently 1ft. broad, cut to the rachis into numerous entire, erecto-patent pinnæ, which are 4in. to 6in. long, ⅜in. to ½in. broad, dilated at base. *sori* slightly immersed, in one or two rows. *areolæ* in three or four rows. Brazil, &c., 1837. See Fig. 231. SYN. *P. neriifolium.*

P. Brownii (Brown's). *rhiz.* woody, wide-creeping, with dull brown scales. *fronds* scattered, 6in. to 18in. long, ½in. to ¾in. broad, ligulate, with a blunt point, entire or slightly repand edges, and the lower part gradually narrowed to a base or short stem. *sori* large, immersed, arranged in a single row, end to

Polypodium—*continued.*

end, with a space between each, midway between the midrib and edge. *areolæ* uniform. Australia, &c., 1823. Greenhouse. SYNS. *P. attenuatum* (H. G. F. 30), *Phymatodes Brownii.*

P. californicum (Californian). *rhiz.* wide-creeping, with spreading, ferruginous scales. *sti.* 3in. to 6in. long, firm, erect, naked. *fronds* 6in. to 9in. long, 3in. to 5in. broad, oblong-deltoid, cut down nearly or quite to the rachis into entire or finely-toothed pinnæ, 1½in. to 2½in. long, ⅜in. to ½in. broad, the lowest not reduced. *sori* large, in single rows near the midrib. California. Greenhouse. SYN. *Goniophlebium californicum.*

P. Cameroonianum (Cameroons). *sti.* 4ft. long, glossy. *fronds* 3ft. to 4ft. long, 2ft. broad, the upper part pinnatifid, with deep, lanceolate lobes; lower pinnæ deltoid, upwards of 1ft. long, 6in. to 8in. broad, cut down below nearly to the rachis into lanceolate, pinnatifid lobes. *sori* in rows near the main veins. *areolæ* copious. Cameroon Mountains. SYN. *Dictyopteris Cameroonianis.*

P. capitellatum (small-headed). A synonym of *P. juglandifolium.*

P. Catharinæ (St. Catherine's). *rhiz.* wide-creeping, with dark brown scales. *sti.* 4in. to 6in. long, erect, glossy. *fronds* 6in. to 12in. long, 3in. to 5in. broad, cut down to the rachis into close, blunt, sub-entire, spreading pinnæ, 1½in. to 3in. long, ½in. to ¾in. broad, the lowest pair shorter and deflexed. *sori* large, in two rows close to the midrib. Brazil, 1824.

P. ciliatum (ciliated). A variety of *P. piloselloides.*

P. colpodes (embosomed). A synonym of *P. plesiosorum.*

P. conjugatum (mixed). *rhiz.* very thick, densely matted, with light brown scales. *fronds* 2ft. to 4ft. long, 1ft. to 1½ft. broad, arranged in a circle, the stem with a lobed wing, 2in. to 4in. broad, on each side at the base, which is narrowed and more deeply lobed upwards, passing gradually into the frond, which is cut down nearly to the rachis throughout into entire, erecto-patent pinnæ, 4in. to 8in. long, 1in. to 1½in. broad. *sori* in a single row close to the anterior main vein, sometimes confluent. India, &c. SYNS. *P. coronans, Drynaria conjugata.*

P. coronans (crowned). A synonym of *P. conjugatum.*

P. corymbiferum (corymbose). A form of *P. Lingua.*

P. crassifolium (thick-fronded).* *rhiz.* woody, short-creeping, with dull brown scales. *sti.* 2in. to 6in. long, strong, erect. *fronds* 1ft. to 3ft. long, 1in. to 5in. wide, gradually narrowed to both ends, the edge entire, upper side with scattered small, white, dots; texture very coriaceous. *sori* in single rows between the main veins, two to nine in a row between the edge and midrib. West Indies, &c., 1823. SYN. *Pleuridium crassifolium.* The variety *albo-punctatissimum* is a much-dotted form, with less distinctly raised veins than usual. SYN. *Pleuridium albo-punctatissimum.*

P. crassinervium (thickly-nerved). A synonym of *P. platyphyllum.*

P. crenatum (scolloped). *sti.* 1ft. to 2ft. long, erect, naked or pubescent. *fronds* 1ft. to 2ft. long, 1ft. or more broad, with an oblong-lanceolate, terminal pinna, 6in. to 8in. long and 1½in. to 2in. broad, the edge a little bluntly lobed or nearly entire, and two or four opposite pairs of similar ones. *sori* in rows near the main veins. Cuba, &c., 1823. SYN. *Goniopteris crenata.*

P. curvatum (curved). *rhiz.* stout, scaly. *sti.* 3in. to 4in. long, naked, glossy, dark brown. *fronds* 1ft. to 1½ft. long, 2in. to 3in. broad, pendent, cut down to the rachis into close, crenated, linear pinnæ, which are decurrent at base. *sori* bright yellow, in two long rows. Jamaica, &c., 1823.

P. cuspidatum (pointed). A synonym of *P. persicæfolium.*

P. cyatheæfolium (Cyathea-fronded). *sti.* 1ft. to 1½ft. long, firm, naked, stramineous. *fronds* 1½ft. to 2ft. long, 1ft. or more broad; pinnæ 6in. to 9in. long, 2in. or more broad, cut down to a broadly-winged rachis into falcate, entire lobes, ½in. to ⅝in. broad, the lowest pair rather smaller and deflexed. *sori* about the centre of the veinlets. Mauritius and Bourbon. SYN. *P. Sieberianum.*

P. decumanum (tall). *rhiz.* stout, with soft, bright, ferruginous scales. *sti.* 1ft. to 2ft. long, stout, erect, glossy. *fronds* 1ft. to 3ft. long, 1ft. to 2ft. broad, cut down nearly, or below quite, to the rachis into ligulate, nearly entire pinnæ, often 1ft. long, 2in. to 3in. broad. *sori* each terminating two or three free veinlets. Tropical America, Brazil, 1818. SYNS. *P. dictyocallis, Phlebodium decumanum.*

P. decurrens (decurrent). *rhiz.* wiry, rather slender, with deciduous scales. *sti.* 6in. to 12in. long, firm, naked. *fronds* usually with several erecto-patent pinnæ on each side, which are 8in. to 12in. long, 1½in. to 2in. broad, with an acuminate point, a narrowed base, and nearly entire edges. *areolæ* about six, between the edge and midrib, with two or three sori in each. Brazil and Peru. SYN. *Campyloneurum decurrens.*

P. decussatum (decussate). *sti.* 2ft. to 3ft. long, stout, erect, polished upwards, scaly at base, sometimes slightly muricated. *fronds* 3ft. to 4ft. or more long, 1ft. to 1½ft. broad; pinnæ 8in. to 12in. long, 1in. to 1½in. broad, cut down nearly or quite to the rachis into close, spreading, entire, blunt lobes, with a large, subulate gland at the base beneath. *sori* in rows near the midrib. West Indies, &c. SYN. *Phegopteris decussata.*

P. deflexum (bent-down). *cau.* erect, with dull brown scales. *sti.* 2in. to 3in. long, slender, naked, stramineous. *fronds* 8in. to 12in. long, 2in. broad; pinnæ 1in. long, ¼in. broad, lanceolate, acuminate, cut down to the rachis into linear-oblong, pointed lobes; lower pinnæ deflexed, gradually dwindling to mere auricles; both sides slightly hairy. *sori* nearer the midrib than the edge. New Grenada, 1830. SYN. *Phegopteris deflexa.*

FIG. 232. PINNA OF POLYPODIUM DIVERSIFOLIUM.

P. Dianæ (Diana's). A synonym of *P. molle.*

P. dictyocallis (beautifully-netted). A synonym of *P. decumanum.*

P. difforme (deformed). *sti.* tufted, erect, 1ft. or more long, scaly below. *fronds* 3ft. to 4ft. long; upper pinnæ lanceolate, entire, or with broad, blunt or falcate lobes reaching half way or more down to the rachis; lower pinnæ often deltoid, with the lobes of the lower side prolonged and pinnatifid. *sori* scattered, very copious. *areolæ* also copious. Malay Peninsula and Isles. SYNS. *P. irregulare, Dictyopteris irregularis.*

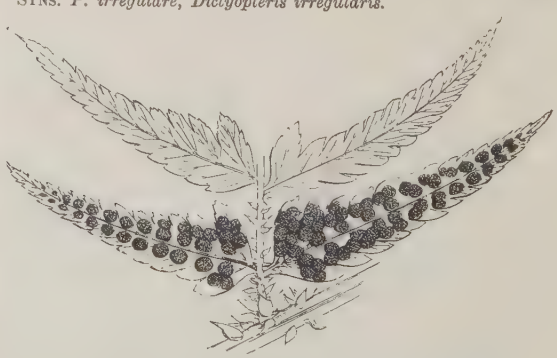


FIG. 233. PORTION OF FROND OF POLYPODIUM DREPANUM.

P. dilatatum (dilated). *rhiz.* woody, thick, with large, dull brown scales. *sti.* 1ft. or more long, with a narrow wing reaching nearly to the base. *fronds* 1½ft. to 3ft. long, 1ft. or more broad, cut down within about ½in. of the rachis into entire, acuminate, erecto-patent lobes, 4in. to 8in. long, ½in. to 1½in. broad. *sori* small, copious, irregularly scattered. *areolæ* fine, copious, with free veinlets. North India, &c. SYN. *Colysis dilatata.*

Polypodium—*continued.*

P. diversifolium (variable-fronded). *sti.* 1ft. to 2ft. long, tufted, slender, naked. *fronds* 1ft. to 2ft. long, 6in. to 9in. broad; pinnæ 3in. to 5in. long, ⅜in. to 1in. broad, the apex acuminate, the lower ones narrowed at base, the edge nearly entire. *sori* in contiguous rows. South Brazil, &c. See Fig. 232. SYN. *P. fraxinifolium.*

P. diversifolium (variable-fronded), of R. Brown. A synonym of *P. rigidulum.*

P. drepanum (sickle).* *sti.* tufted, 1ft. to 1½ft. long, with dark scales below. *fronds* 1½ft. to 3ft. long, 8in. to 12in. broad; lowest pinnæ the largest, 6in. to 8in. long, 1½in. to 2in. broad; pinnules lanceolate, unequal-sided, auricled on the upper, truncate on the lower, side at the base, with a broad, uncut centre and copious, spinous teeth, the lowest stalked. *sori* medial. Madeira. Greenhouse. See Fig. 233. SYN. *Phegopteris drepana.*

FIG. 234. POLYPODIUM DRYOPTERIS.

P. Dryopteris (Dryopteris).* Oak Fern. *rhiz.* slender, wide-creeping. *sti.* 6in. to 12in. long, slender, stramineous, scaly below, naked upwards. *fronds* 6in. to 10in. each way, deltoid; lower pinnæ much the largest; pinnules lanceolate, only the lowest free, oblong, slightly crenate. *sori* sub-marginal. Northern hemisphere (Britain). See Fig. 234.

P. D. Robertianum (Herb-Robert scented). A variety with a thicker rhizome, the whole plant being more rigid than in the type, and finely glandular. (H. B. F. 5.)

P. elasticum (elastic). *rhiz.* stout, woody, short-creeping or sub-erect, with brown scales. *fronds* 9in. to 18in. long, 2in. to 4in. broad, lanceolate, cut down to the rachis into patent, adnate, ligulate, entire, blunt forty to one hundred-jugate pinnæ, the lower ones gradually reduced. *sori* minute, superficial, medial. Mexico, &c., 1824. SYNS. *P. Plumula, P. Schkuhri.*

P. ensifolium (sword-fronded). A form of *P. angustifolium.*

P. Filipes (thread-footed). A young state of *P. tenellum.*

P. fraternum (fraternal).* *rhiz.* wide-creeping, with bright ferruginous scales. *sti.* 4in. to 8in. long, firm, erect, naked. *fronds* 1ft. to 1½ft. long, 6in. to 9in. broad; lower pinnæ 1in. apart, 4in. to 5in. long, narrowed at both ends, and with obscurely crenated edges. *sori* slightly immersed, medial, uniseriate. Mexico. SYN. *P. Henchmanni.*

P. fraxinifolium (Ash-leaved). *rhiz.* stout, with dark brown scales. *sti.* 1ft. to 2ft. long, firm, erect, naked. *fronds* 2ft. to 4ft. long, 1ft. to 1½ft. broad; pinnæ numerous on each side, distinct, 4in. to 9in. long, 1in. to 2in. broad, the apex acuminate, the base narrowed, and the edge entire. *sori* and *areolæ* in series of six to eight. Columbia, &c. See Fig. 235. SYN. *Goniophlebium fraxinifolium.*

P. fraxinifolium (Ash-leaved), of Jacquin. A synonym of *P. diversifolium.*

P. Gardneri (Gardner's). *rhiz.* short-creeping; scales black, bordered with brown. *sti.* 3in. to 4in. long, firm, naked. *fronds* 1ft. to 1½ft. long, 1in. to 1½in. broad, narrowed gradually towards both ends, with entire edges; lower surface densely grey-tomentose. *sori* in close rows of about four each between the main veins. Ceylon. (H. E. F. 68.) SYN. *Niphobolus Gardneri.*

P. geminatum (paired). *rhiz.* very wide-creeping, stout, with ferruginous scales. *fronds* sub-sessile, usually in distant pairs, entire, uniform, 3in. to 6in. long, ½in. to 1in. broad, narrowed towards both ends, but the point often blunt. *sori* in a row

Polypodium—*continued.*

midway between the edge and midrib, distinctly immersed. Brazil. SYN. *Anapeltis geminata.*

P. Ghiesbreghtii (Ghiesbreght's). *sti.* 1ft. or more long, firm, erect, densely villous. *fronds* 1ft. to 1½ft. long, with a terminal pinna 6in. to 9in. long, 1½in. to 2in. broad, the edge slightly lobed, and three to six similar ones on each side; rachises and under surface densely villous, upper surface slightly so. *sori* in dense rows close to the main vein. South Mexico. SYN. *Goniopteris crenata.*

P. glaucophyllum (glaucous-fronded). *rhiz.* wide-creeping, firm, deciduously scaly. *sti.* 2in. to 6in. long, scattered, firm, erect, glossy. *fronds* 4in. to 10in. long, 1in. to 2in. broad, uniform, oblong-lanceolate, entire, with a rounded base and an acuminate point. *areolæ* four to six in a series between the edge and midrib, with one sorus in each. Tropical America, &c., 1874. SYN. *Goniophlebium glaucophyllum.*

P. gonatodes (angled). A synonym of *P. plesiosorum.*

P. grandidens (large-toothed). A variety of *P. persicæfolium.*

P. grandifolium (large-fronded). A variety of *P. membranaceum.*

FIG. 235. PINNA OF POLYPODIUM FRAXINIFOLIUM.

P. guatemalense (Guatemalan). *sti.* 6in. to 12in. long, naked, stramineous. *fronds* 2ft. to 3ft. long, 1ft. or more broad, with an entire, terminal pinna 6in. to 8in. long, 1in. to 1¼in. broad, and several similar ones on each side, the upper ones narrowed, but adnate at the base. *areolæ* in series of three or four, with the large, uniseriate sori in the first or second row. Guatemala. SYN. *Phlebodium inæquale.*

P. harpeodes (scimitar-like). A synonym of *P. loriceum latipes.*

P. hastæfolium (spear-fronded). *sti.* tufted, 1in. to 2in. long, wiry, deciduously scaly. *fronds* 6in. to 9in. long, 1½in. to 2in. broad; pinnæ blunt, entire, ⅜in. broad, with a sharp, distinct auricle on both sides at the base, those of the lower half of the frond gradually reduced. *sori* below the middle of the veinlets. West Indies. SYN. *Phegopteris hastæfolia.*

P. hemionitideum (Hemionitis-like). *rhiz.* hypogæous, woody. *sti.* 1in. to 6in. long, firm, woody. *fronds* 9in. to 18in. long, 2in. to 3in. broad, narrowed to both ends, with entire edges. *sori* in an irregular row between each main vein, often confluent. India and China. SYN. *Colysis membranacea.*

P. Henchmanni (Henchmann's). A synonym of *P. fraternum.*

P. Heracleum (Cow-Parsnip-like).* *rhiz.* stout, with light brown, silky scales. *fronds* 3ft. to 6ft. long, 2ft. or more broad, with a cordate lobed wing, ⅜in. broad, at the base; upper part

Polypodium—*continued.*

cut down to a broadly-winged rachis into entire, acute lobes, which are often 1ft. to 1½ft. long and 3in. to 4in. broad. *sori* small, copious, slightly immersed, scattered. Java and Philippines. See Fig. 236. (H. G. F. i.) SYNS. *P. morbillosum, Drynaria Heraclea.*

FIG. 236. POLYPODIUM HERACLEUM.

P. hexagonopterum (six-angled-winged). *rhiz.* wide-creeping. *sti.* 1ft. to 1½ft. long, slender, glossy, stramineous. *fronds* 8in. to 12in. long, and nearly as broad, deltoid; lower pinnæ 4in. to 6in. long, the lowest pair deflexed, often 2in. broad; pinnules reaching down nearly to the rachis, those of the lower side 1in. to 1½in. long, pinnatifid half way down with broad, blunt lobes; under side slightly villous. *sori* marginal. North America, 1811. Hardy. SYN. *Phegopteris hexagonoptera.*

P. himalayense (Himalayan). *rhiz.* wide-creeping, woody, with long, yellowish-brown scales. *sti.* 6in. to 9in. long, firm, erect, naked. *fronds* 1ft. to 2ft. long, 8in. to 10in. broad; pinnæ in distant pairs, 4in. to 8in. long, 1½in. to 2in. broad, with an acuminate point, scarious, wavy edges, and the base rounded or cordate; under surface pubescent. *sori* in one or two rows, of three or four each, between the main veins. *areolæ* close, fine. North India. SYNS. *P. venustum, Phymatodes himalayensis.*

P. incanum (hoary). *rhiz.* wide-creeping, woody, with dense, dull brown scales. *sti.* 1in. to 4in. long, erect, firm, furfuraceous. *fronds* 2in. to 4in. long, 1in. to 1½in. broad, cut down to the rachis into entire, spreading, somewhat distant pinnæ, ⅛in. broad, dilated at base; under side densely scaly. *sori* uniseriate. Temperate America and South Africa, &c., 1840. Greenhouse. SYN. *Lepicystis incana.*

P. incurvatum (incurved). *rhiz.* woody, with adpressed scales. *fronds* dimorphous; barren ones 6in. to 9in. each way, deltoid, ternate, or pinnatifid, with broad, lanceolate, acuminate, entire lobes, and a firm, glossy stem, 6in. to 9in. long; fertile ones larger, cut almost, or below quite, to the rachis into distant, erecto-patent, entire lobes, 4in. to 8in. long, about ¼in. broad, the lowest occasionally forked. *sori* uniseriate, quite immersed, and forming prominent papillæ on the upper surface. Malaccas. SYN. *Phymatodes incurvata.*

P. irregulare (irregular). A synonym of *P. difforme.*

P. juglandifolium (Walnut-leaved).* *rhiz.* woody, stout, with bright ferruginous scales. *sti.* 1ft. or more long, erect. *fronds* 1½ft. to 2ft. long, 1ft. or more broad; pinnæ 4in. to 8in. long, 1in. to 1½in. broad, in pairs about 2in. apart, with an acuminate tip, thickened and wavy edges, and a rounded base. *sori* large, one between each main vein, forming a row nearer the midrib than the edge. *areolæ* copious, hidden. North India. SYNS. *P. capitellatum, Pleuridium juglandifolium.*

P. lachnopodium (downy-footed). *sti.* densely hairy at the base (as is also the rachis). *fronds* 2ft. to 5ft. long, bi-tripinnatifid; pinnules 9in. to 12in. long, lanceolate. Jamaica, 1843. A rare species in cultivation.

P. lanceolatum (lance-shaped). *rhiz.* wide-creeping, wiry, with bright ferruginous scales. *sti.* 1in. to 3in. long, distant, erect. *fronds* 3in. to 9in. long, about ½in. broad, gradually narrowed at both ends; both sides coated with peltate scales. *sori* large, immersed, uniseriate, sometimes reaching from the edge to the midrib. West Indies, &c., 1812. (H. E. F. 62, under name of *Pleopeltis ensifolia.*)

P. leiorhizon (smooth-rhizomed). *rhiz.* very thick, with adpressed scales. *sti.* 1ft. to 2ft. long, erect, firm. *fronds* 2ft. to 4ft. long, 1ft. to 2ft. broad; pinnæ narrowed at base, the lower ones stalked, 6in. to 12in. long, ¾in. to 1½in. broad, with an acuminate apex and entire edge. *sori* slightly immersed, in a row near the midrib on each side. *areolæ* fine, uniform. North India. SYN. *Phymatodes leiorhiza.*

Polypodium—*continued.*

P. lepidopteris rufulum (scaly-winged, reddish). *rhiz.* stout, with bright reddish-brown scales. *sti.* 1in. to 4in. long, erect. *fronds* 6in. to 8in. long, 1½in. to 3in. broad, cut down to the rachis into horizontal, entire pinnæ, ⅜in. broad, blunt, much twisted, the lower gradually reduced. *sori* copious. Mexico, &c. SYN. *P. rufulum.*

P. l. sepultum (inclosed). *fronds* ovate-lanceolate; lower pinnæ scarcely reduced. Otherwise similar to *P. l. rufulum* SYN. *P. sepultum.*

P. Lindleyanum (Lindley's). A form of *P. palmatum.*

P. lineare (linear). *rhiz.* woody, wide-creeping, with dull brown scales. *sti.* from almost none to 1in. to 2in. long. *fronds* 6in. to 12in. long, ⅛in. to 2in. broad, entire, narrowed gradually to both ends. *sori* distinctly immersed, large, prominent, forming a single row nearer the midrib than the edge, scaly when young. North India. (H. G. F. 14, under name of *Pleopeltis nuda.*) In the variety *simplex*, the fronds are sometimes 1½ft. long and 2in. broad.

P. Lingua (tongue-like).* *rhiz.* wide-creeping, with ferruginous scales. *sti.* 3in. to 6in. long, firm, erect. *fronds* uniform, 4in. to 8in. long, 1in. to 4in. broad, the apex often cuspidate, the edge entire, the base narrowed or rounded; lower surface matted with close, cottony, somewhat ferruginous down. *sori* in close rows of four to six each between the main veins, rather large and prominent. North India, Japan, &c. SYN. *Niphobolus Lingua.* The variety *corymbiferum* has fronds much divided at the apex, forming a cluster.

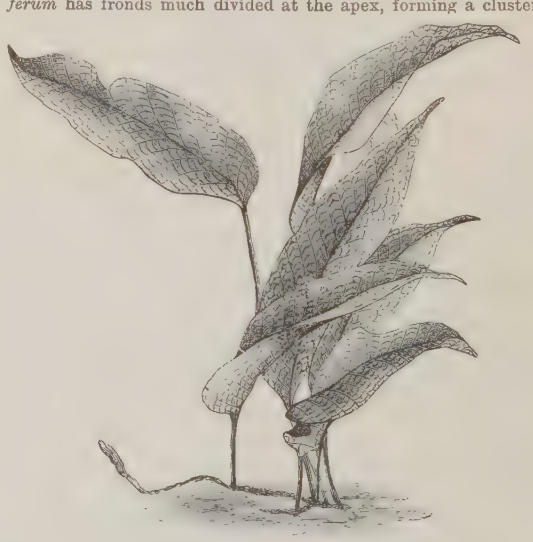


FIG. 237. POLYPODIUM LINGUA HETERACTIS.

P. L. Heteractis (Heteractis). This form differs from the type in having broader, oblong-lanceolate fronds. Himalayas. See Fig. 237. SYN. *Niphobolus latus.*

P. longifolium (long-fronded). *rhiz.* short-creeping, woody, with nearly black scales. *fronds* 1ft. to 2ft. long, ½in. to 1½in. broad, with an acute apex and an entire, revolute edge, the lower part gradually narrowed into a short stem. *sori* oblong, immersed, in a line near the edge. Malaccas and Philippines, 1819.

P. longipes (long-stalked). A garden form of *P. Phymatodes.*

P. longissimum (very long). *rhiz.* wide-creeping, with brown, adpressed scales. *sti.* 3in. to 4in. long, firm. *fronds* 1ft. to 4ft. long, 6in. to 12in. broad, cut nearly to the rachis into numerous sub-entire, erecto-patent lobes, 4in. to 8in. long, ¼in. to ½in. broad. *sori* in close, single rows near the midrib, forming distinct papillæ on the upper surface. North India, &c. SYN. *Phymatodes longissima.*

P. loriceum (armour-clad). *rhiz.* wide-creeping, stout, with black scales. *sti.* sometimes ebeneous, 4in. to 6in. long. *fronds* 1ft. to 1½ft. long, 4in. to 6in. broad; pinnæ close, 2in. to 3in. long, ⅜in.

Polypodium—*continued.*

to ½in. broad, sub-entire, dilated at base on the upper side. *areolæ* usually in two distinct rows, with the small sori often in both. Mexico, &c. SYN. *Goniophlebium loriceum.*

P. l. latipes (broad-stalked). A larger but less rigid form, having dense, dull brown scales, and pinnæ much dilated on both sides at the base. SYNS. *P. harpeodes, P. vacillans.*

P. lucidum (shining). *rhiz.* short-creeping. *sti.* erect, firm, short. *fronds* 6in. to 12in. long, ½in. to ¾in. broad, edge entire, both ends narrowed, both sides very glossy. *sori* confined to the upper part of the frond, not copious. *areolæ* in two or three irregular rows. Venezuela and Brazil. SYNS. *P. nitidum, Campyloneurum rigidum.*

P. lycopodioides (Lycopodium-like). *rhiz.* firm, wide-creeping, with ferruginous scales. *fronds* dimorphous, distant, either sessile or shortly stalked; barren ones 2in. to 4in. long, ⅛in. to 1in. broad, entire, frequently blunt, gradually narrowed at base; fertile ones narrower and longer. *areolæ* in several rows, those containing the uniseriate sori being largest. Tropical America, &c., 1793. SYN. *Anapeltis lycopodioides.*

FIG. 238. FROND OF POLYPODIUM LYCOPODIOIDES OWARIENSE.

P. l. owariense (Owara). This variety only differs from the type in the shorter, oval, bluntly-pointed frond. See Fig. 238.

P. macrocarpum (large-fruited). *rhiz.* wide-creeping, stout, densely scaly. *sti.* 1in. to 3in. long, wiry, often flexuous, deciduously scaly. *fronds* 3in. to 4in. long, 1in. or more broad, lanceolate, cut nearly to the rachis into blunt, entire or obscurely toothed pinnæ, ⅜in. broad, dilated at base, and with a rounded sinus between them; lower surface densely scaly. *sori* copious, large. Bolivia to Chili.

P. macrodon (large-toothed). *rhiz.* decumbent. *sti.* 1ft. or more long, scaly below. *fronds* 2ft. to 3ft. long, 1ft. to 1½ft. broad, apex deeply pinnatifid; pinnæ below the apex numerous, lanceolate, the lowest sometimes 1ft. long and 6in. to 8in. broad, cut down to a narrow wing on the rachis into close, lanceolate, pinnatifid pinnules. *sori* small, in rows near the main veins. *areolæ* copious. Philippines, &c., 1840. SYN. *Dictyopteris macrodonta.*

P. macropterum (large-winged). Trunk somewhat arborescent. *sti.* 2ft. or more long, strong, glabrous, angular. *fronds* 4ft. to 6ft. or more long; pinnæ lanceolate, 6in. to 9in. long, 2in. broad, with entire, oblong-falcate lobes, ½in. to ⅝in. broad, reaching down three-quarters of the way to the midrib. Brazil.

P. madrense (Sierra Madre). *rhiz.* wide-creeping, stout, densely scaly. *sti.* 2in. to 4in. long, firm, erect. *fronds* 3in. to 5in. long, 1½in. to 2in. broad, cut nearly to the rachis into horizontal, entire, blunt pinnæ, ⅜in. broad, with a rounded sinus between them; under side and ebeneous rachis scaly. *sori* copious, large. North-west Mexico, &c.

P. marginellum (slightly-margined). *sti.* densely tufted. *fronds* 3in. to 6in. long, about ½in. broad, blunt, gradually tapering into the short stem, naked or slightly hairy on both sides, margined with a distinct, black line. *sori* close, copious, oval or oblong, in rows nearer the midrib than the edge. West Indies. SYN. *Grammitis marginella.*

P. Martensii (Martens'). *rhiz.* wide-creeping, stout, with bright ferruginous scales. *sti.* 1in. to 2in. long, erect, firm. *fronds* 8in. to 12in. long, 3in. to 4in. broad, cut down to the rachis into numerous horizontal, entire pinnæ, ⅜in. broad, distant their own breadth; both surfaces and rachis finely villous. *sori* medial, twelve or more on each side. Mexico.

P. megalodus (picture-like). A variety of *P. androgynum.*

P. membranaceum (membranous). *rhiz.* stout, with lurid-green scales. *sti.* 1in. to 4in. long, erect, firm. *fronds* 1ft. to 3ft. long, 2in. to 6in. broad, with an entire or repand edge, both ends being gradually narrowed. *sori* mostly in two rather irregular rows near the main veins. North India to Ceylon. SYN. *Colysis membranacea.* The variety *grandifolium* has larger fronds, and more copious and irregularly-scattered sori.

P. menisciifolium (Meniscium-leaved). *sti.* 1ft. to 2ft. long, erect, firm, naked. *fronds* 2ft. to 3ft. long, 1ft. or more broad, with an entire, terminal pinna, 6in. to 9in. long, 1½in. to 2in. broad,

Polypodium—*continued.*

and numerous similar ones on each side, all narrowed at base. *sori* and *areolæ* in rows of about four, the former immersed and prominent on the upper side. Brazil, &c., 1840. SYN. *Goniophlebium menisciifolium.*

P. molle (soft). *sti.* 1ft. or more long, stout, with deciduous scales. *fronds* 2ft. to 3ft long, 1ft. to 1½ft. broad; lower pinnæ not reduced, 6in. to 9in. long, 1½in. to 2in. broad, cut to a broadly-winged rachis into oblong, entire or crenated, blunt lobes; under surface finely villous. *sori* small, copious, distant from the midrib. St. Helena. SYNS. *P. Dianæ, Phegopteris mollis.*

P. morbillosum (diseased). A synonym of *P. Heracleum.*

P. musæfolium (Musa-leaved). *rhiz.* woody, with dull brown scales. *fronds* 1ft. to 3ft. long, 3in. to 4in. broad, with an acute or rather blunt point; lower part broadly winged to the base. *sori* small, numerous, sometimes covering nearly the whole surface. Malay Isles. SYN. *Phymatodes musæfolia.*

P. myriocarpum (many-fruited). A variety of *P. pellucidum.*

P. neriifolium (Oleander-leaved). A synonym of *P. brasiliense.*

P. nigrescens (blackish). *rhiz.* stout, adpressedly scaly. *sti.* 1ft. to 1½ft. long, erect, glossy, firm. *fronds* 2ft. to 3ft. long, 1ft. or more broad, cut within 1in., or less, of the rachis into numerous linear-oblong, entire, acuminate lobes, 6in. to 12in. long, 1in. to 2in. broad. *sori* in a single row nearer the midrib than the edge, sunk in a deep cavity, which is prominent on the upper side. India, &c. SYN. *Phymatodes nigrescens.*

P. nigripes (black-stalked). *rhiz.* stout, with black, rigid, ferruginous-edged scales. *sti.* almost 1ft. long, firm, erect, slightly scaly. *fronds* 1ft. long, 6in. to 7in. broad, cut nearly, or below quite, to the rachis into pinnæ, which are about ½in. broad, and slightly crenate towards the bluntish point; under surface furfuraceous. *sori* in single rows on each side the midrib. Venezuela. SYN. *Phlebodium nigripes.*

P. nitidum (shining). A synonym of *P. lucidum.*

P. obliquatum (oblique). *sti.* 1in. or more long, rigid, tufted, naked or villous. *fronds* 8in. to 12in. long, 1½in. to 2in. broad, cut down throughout to the rachis into horizontal or decurved, acute, slightly-sinuated pinnæ, ⅛in. broad, dilated at base, the lower ones being blunt and shorter; edges of the fertile pinnæ sometimes undulated. *sori* sunk in a cavity, four to six on each side. India, &c., 1841.

P. Otites (Otites). A synonym of *P. tenuifolium.*

P. oxylobum (sharply-lobed). A synonym of *P. trifidum.*

P. palmatum (palmately-lobed). *rhiz.* stout, brown-scaly. *sti.* 6in. to 12in. long, erect, firm, glossy. *fronds* 6in. to 18in. long, 8in. to 12in. broad, with a linear or oblong, repand or entire, terminal lobe, and one to six similar ones on each side, 4in. to 6in. long, ½in. to 1½in. broad, narrowed or dilated, slightly adnate at base, those of the barren frond broadest. *sori* in a single row midway between the edge and midrib. Malaccas and Philippines. SYNS. *P. angustatum, Plewridium palmatum. P. Lindleyanum* is merely a form of this species.

P. papillosum (nippled). *rhiz.* wide-creeping, stout, scaly. *sti.* 4in. to 6in. long, slender, rigid, erect. *fronds* 1ft. or more long, 2in. broad, cut to the rachis into horizontal, close, blunt, entire or slightly crenated pinnæ, ½in. broad; veins black. *sori* deeply immersed in rows near the edge, the cavities prominent on the upper side. Java and Philippines.

P. Paradiseæ (Paradise). *fronds* 1ft. to 4ft. long, 3in. to 8in., or more, broad, slightly pubescent, deeply pinnatifid, upright, slightly arched at top. *sori* bright golden-yellow, imparting a charming appearance to the plant. Brazil, 1841.

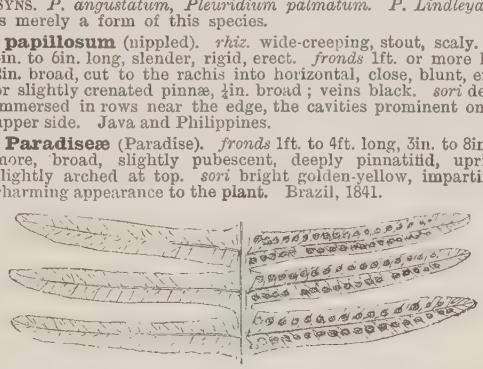


FIG. 239. PORTION OF FROND OF POLYPODIUM PECTINATUM.

P. pectinatum (comb-like).* *rhiz.* fibrillose, stout. *sti.* 2in. to 6in. long, erect, rigid, naked or finely villous. *fronds* 1ft. to 3ft. long, 2in. to 6in. broad, naked or finely villous, cut down to the rachis; pinnæ about ½in. broad, close, horizontal, blunt, entire or slightly toothed, the lower ones much reduced. *sori* in long rows. Mexico, &c., 1793. See Fig. 239. (H. G. F. 10.)

P. pellucidum (pellucid-veined). *rhiz.* wide-creeping, stout, densely scaly. *sti.* rigid, erect, 3in. to 6in. long, glossy. *fronds* 3in. to 12in. long, 3in. to 5in. broad, cut nearly to the rachis into entire or sub-acute, close, blunt pinnæ, ¼in. to ⅜in. broad; veinlets beautifully pellucid. *sori* prominent, large. Sandwich Isles. The variety *myriocarpum* is a form with pinnatifid pinnæ.

P. peltideum (shield-like). A garden form of *P. Phymatodes.*

P. pennigerum (feathered). *sti.* 6in. to 12in. long, tufted, slightly scaly. *fronds* 1½ft. to 2ft. long, 8in. to 12in. broad; pinnæ 4in. to 6in. long, nearly 1in. broad, cut half-way down into slightly crenated, blunt, falcate lobes, about ⅛in. broad; lower pinnæ

Polypodium—*continued.*

gradually reduced. *sori* in rows near the midrib. New Zealand, 1835. Greenhouse. SYN. *Goniopteris pennigera.*

P. percussum (sharp-pointed). *rhiz.* wide-creeping, wiry, with adpressed scales. *sti.* distant, 2in. to 3in. long, firm, erect. *fronds* 6in. to 12in. long, ⅜in. to 1¼in. broad, entire, gradually narrowed towards both ends, with the under side scaly. *sori* round, distinctly immersed, forming a row midway between the edge and midrib. *areolæ* fine, distinct. Brazil, &c. SYN. *Pleopeltis percussa.*

P. persicæfolium (Peach-leaved). *rhiz.* wide-creeping, with dull brown scales. *sti.* 6in. to 12in. long, firm, naked. *fronds* 2ft. to 3ft. long, 8in. to 12in. broad, decurved; pinnæ 3in. to 6in. long, nearly 1in. broad, distant, with an acuminate apex, a slightly-toothed edge, and the base gradually narrowed, the lower ones being distinctly stalked. *sori* immersed, uniseriate. *areolæ* in about three rows. Java. SYNS. *P. cuspidatum, Goniophlebium persicæfolium.* The variety *grandidens* is a more deeply-toothed form.

P. Phegopteris (Phegopteris).* Beech Polypody. *rhiz.* wide-creeping, slender. *sti.* slender, 6in. to 9in. long, naked, except towards the base. *fronds* 6in. to 9in. long, 4in. to 6in. broad, almost deltoid, slightly hairy beneath; lower pinnæ 2in. to 3in. long, ½in. to ⅝in. broad, cut three-quarters of the way to the rachis into close, entire or slightly-toothed, blunt lobes, ⅛in. broad, the lowest pair deflexed. *sori* nearer the edge than the midrib. Northern hemisphere (Britain).

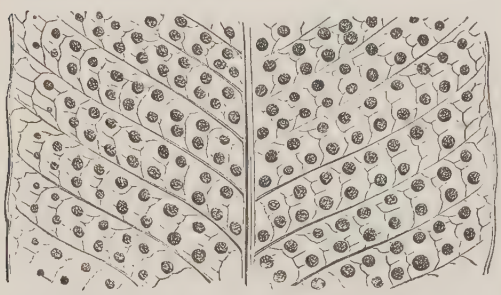


FIG. 240. PORTION OF FROND OF POLYPODIUM PHYLLITIDIS.

P. Phyllitidis (Phyllitidis). *rhiz.* hypogæous, stout, brown-scaly. *sti.* short, scattered or slightly tufted, or none. *fronds* 1ft. to 3ft. long, 1in. to 4in. broad, with an acute point and an entire or slightly sinuated edge, the lower part gradually narrowed; upper surface often cretaceous-dotted. *areolæ* in rows of six to twelve, between the edge and midrib, usually with two sori in each. Florida to South Brazil, 1793. See Fig. 240. SYN. *Campyloneurum Phyllitidis.*

P. Phymatodes (Phymatodes). *rhiz.* woody, wide-creeping, with dark brown scales. *sti.* 3in. to 12in. long, glossy, firm, erect. *fronds* varying from simple, oblong-lanceolate, to 2ft. to 3ft. long and 1ft. broad, cut down to the broadly-winged rachis into numerous lanceolate-oblong, entire, acuminate lobes, 4in. to 8in. long, and 1in. to 1½in. broad. *sori* large, immersed, scattered, or one or two-seriate. East Indies, &c., 1823. SYN. *Phymatodes vulgaris. P. longipes, P. peltideum,* and *P. terminale,* are merely garden varieties of this species.

FIG. 241. PORTION OF CREEPING RHIZOME (WITH FRONDS) OF POLYPODIUM PILOSELLOIDES.

Polypodium—*continued.*

P. piloselloides (Pilosella-like).* *rhiz.* very wide-creeping, scandent, with squarrose scales. *fronds* dimorphous; barren ones 1in. to 3in. long, ⅛in. to ⅜in. broad, oblong, entire; fertile ones narrower and longer; both on short, ciliated stems, naked, hairy, or scaly. *sori* large, uniseriate, confined to the large costal areolæ. Tropical America, 1793. See Fig. 241. (H. G. F. 18.) SYNS. *Goniophlebium piloselloides, Lopholepis piloselloides.* In the variety *ciliatum,* the fertile fronds are so narrow that the sori project along the edge.

P. platyphyllum (broad-leaved). *rhiz.* woody, with nearly black scales. *sti.* 3in. to 4in. long, erect, strong. *fronds* 1ft. to 1½ft. long, 2in. to 4in. broad, the edge entire, the point acute, upper surface dirty-white dotted. *sori* immersed, in single rows between the main veins, eight or nine between the midrib and edge. Java. SYN. *P. crassinervium.*

P. plebeium (plebeian). *rhiz.* wide-creeping, stout, grey-scaly. *sti.* strong, erect, 4in. to 8in. long, castaneous. *fronds* 6in. to 12in. long, 3in. to 6in. broad, deltoid-ovate, cut nearly or quite to the rachis; pinnæ spreading, entire or obscurely crenated, ¼in. to ⅜in. broad, the lowest not reduced; under side and rachis scaly. *sori* copious. Mexico to Peru.

P. plectolepis (plaited-scaled). *rhiz.* stout; scales ferruginous, squarrose. *sti.* firm, glossy, stramineous, 6in. to 12in. long. *fronds* 1ft. to 2ft. long, 1ft. broad; pinnæ spreading, numerous, 4in. to 6in. long, about ½in. broad, gradually narrowed from base to point, the edge crenate; both sides finely pubescent. *sori* and *areolæ* in a single series. Mexico and Guatemala. SYN. *Goniophlebium plectolepis.*

P. plesiosorum.* *rhiz.* stout, reddish-scaly. *sti.* firm, erect, 2in. to 4in. long, glossy. *fronds* 6in. to 12in. long, 4in. to 6in. broad, cut to the rachis; pinnæ close, entire, about ½in. broad, gradually narrowed upwards, slightly dilated on both sides at the base. *sori* prominent, in a single row close to the midrib (whence the specific name). *areolæ* usually in two rows. Mexico to Venezuela. SYNS. *P. colpodes, P. gonatodes, P. rhodopleuron.*

P. Plumula (feathered). A synonym of *P. elasticum.*

P. proliferum (proliferous). *rhiz.* stout, creeping. *sti.* 2in. to 8in. long, spreading. *fronds* 1ft. to 2ft. or more long, 6in. to 12in. broad, erect or decumbent, often elongated and rooting at the point, and copiously branched from the axils; pinnæ 4in. to 6in. long, ½in. to ⅝in. broad, broadest at base, truncate or cordate, the edge bluntly lobed; under side and rachis sometimes slightly pubescent. *sori* medial, oval, sometimes confluent. India, China, &c., 1820. SYN. *Goniopteris prolifera.*

P. propinquum (allied). *rhiz.* wide-creeping, woody, with bright ferruginous scales. *fronds* dimorphous; barren ones 4in. to 9in. long, 3in. to 4in. broad, cut half or three-quarters of the way into acute or bluntish lobes; fertile ones 1½ft. to 3ft. long, often 1ft. broad, with a distinct stem, and lobes 4in. to 6in. long, ½in. to ⅝in. broad, reaching nearly or quite to the rachis. *sori* in a row near the midrib, placed at the junction of several veinlets. *areolæ* copious. India, &c. SYNS. *P. Wildenovii* (H. G. F. 35), *Drynaria propinqua.*

P. pruinatum (frosted). Basal scales ferruginous. *fronds* sessile, densely tufted, oblanceolate, erect, ½in. long, ¼in. broad, blunt, deltoid at base, cut more than half way to the rachis into five or six-jugate, blunt lobes; surfaces hairy, the lower slightly pruinose. *sori* round, four to the central lobes, medial. Chontales, Nicaragua.

P. punctatum rugulosum (dotted, slightly wrinkled). *rhiz.* wide-creeping, firm, villous. *sti.* scattered, 1ft. to 2ft. long, firm, erect, polished, viscid. *fronds* 1ft. to 4ft. long, 6in. to 2ft. broad; lower pinnæ sometimes 1ft. to 2ft. long, deltoid; pinnules close, lanceolate; rachis deep purplish-brown, and densely viscid; under side slightly hairy. *sori* copious, marginal. New Zealand, Australia, &c. Greenhouse. SYNS. *P. rugulosum, Phegopteris rugulosa.*

P. pustulatum (blistered).* Scented Polypody. *rhiz.* much-branched, wide-scandent, woody, with dark brown, squarrose scales. *sti.* 1in. to 3in. long. *fronds* varying from entire, 3in. to 9in. long, and ¼in. to ½in. broad, narrowed to both ends, to 1ft. to 1½ft. long, and 3in. to 4in. broad, cut down to a broadly-winged rachis throughout into lanceolate lobes. *sori* immersed, uniseriate, sub-marginal. *areolæ* rather large, irregular. New Zealand and Australia. Greenhouse. See Fig. 242. SYN. *Phymatodes pustulata.*

P. quercifolium (Oak-leaved).* *rhiz.* stout, with bright brown scales, nearly ½in. long. *fronds* dimorphous; barren ones 3in. to 12in. long, 2in. to 6in. broad, sessile, brown, rigid, bluntly lobed often half way down; fertile ones on long stalks, 2ft. to 3ft. long, 1ft. or more broad, cut nearly to the rachis into erecto-patent, entire lobes, 6in. to 9in. long, ½in. to 1½in. broad; main veins distinct to the edge, with four to six quadrangular areolæ between them between the midrib and edge, inclosing each two large sori and copious lesser areolæ. India, Queensland, &c., 1824. SYN. *Drynaria quercifolia.*

P. Reinwardtii (Reinwardt's). A variety of *P. subauriculatum.*

P. repens (creeping). *rhiz.* wide-creeping, tortuous, firm, slender, with deciduous scales. *sti.* 1in. to 5in. long, firm, scattered. *fronds* 6in. to 18in. long, 1in. to 3in. broad, slightly sinuated or entire, the base gradually narrowed, the point acute; both sides

Polypodium—*continued.*

opaque. *areolæ* in rows of five to ten between the edges and midrib, with two sori in each. West Indies, &c., 1810.

P. reptans (creeping). *sti.* 1in. to 8in. long, slender, wiry. *fronds* 4in. to 12in. long, 1in. to 3in. broad, spreading, often decumbent and rooting; pinnæ ½in. to 1½in. long, about ½in. broad, entire or bluntly lobed, often auricled at base, the lower ones stalked; under side and rachis sometimes slightly hairy. West Indies. A very variable species. SYN. *Campyloneurum repens.* The form *asplenioides* is more erect, and larger.

P. rhodopleuron (red-veined). A synonym of *P. plesiosorum.*

P. rigidulum (slightly rigid). *rhiz.* wide-creeping, stout, with glossy-brown scales. *fronds* dimorphous; barren one sessile, 6in. to 9in. long, 3in. to 4in. broad, cut about half way to the rachis into blunt lobes; fertile one 2ft. to 4ft. long, 1ft. to 1½ft. broad, long-stalked, pinnate; pinnæ 6in. to 12in. long, ½in. to ⅝in. broad, 1in. or more apart, narrowed or stalked at base, point acuminate, edge inciso-crenate. *sori* in a single row half way between the midrib and edge. *areolæ* copious. Queensland, &c. (H. G. F. 5.) SYNS. *P. diversifolium, Drynaria rigidula.*

FIG. 242. ENTIRE FROND OF POLYPODIUM PUSTULATUM.

P. rufescens (reddish). *rhiz.* short-creeping. *sti.* 1ft. to 1½ft. long, erect, firm, naked. *fronds* length of stipes, 9in. to 12in. broad, almost deltoid; lower pinnæ largest, deltoid, 6in. to 8in. long, 3in. to 4in. broad; pinnules lanceolate, unequal-sided, bluntly lobed, the lowest nearly down to the rachis. *sori* medial. Java, Queensland, &c. SYN. *Phegopteris rufescens.*

P. rufulum (reddish). A synonym of *P. lepidopteris rufulum.*

P. rugulosum (wrinkled). A synonym of *P. punctatum rugulosum.*

P. rupestre (rock-loving).* *rhiz.* woody, with dark brown scales. *sti.* 4in. to 8in. long, firm, erect. *fronds* 4in. to 8in. long, 1in. to 1½in. broad, with an entire or obscurely repand edge, and an acuminate apex. *sori* in two rows between the main veins, not immersed, six to eight between the edge and midrib. Java and Philippines. SYN. *Pleuridium rupestre.*

P. rupestre (rock-loving), of R. Brown. A synonym of *P. serpens.*

Polypodium—*continued.*

P. sandvicense (Sandwich Isles). A synonym of *P. stegnogrammoides.*

P. Schkuhri (Schkuhr's). A synonym of *P. elasticum.*

P. Scouleri (Scouler's).* *rhiz.* wide-creeping, stout, with dull brown scales. *sti.* firm, erect, naked, 3in. to 4in. long. *fronds* 6in. to 12in. long, 4in. to 8in. broad, cut to the rachis into close, sub-entire, blunt pinnæ, ½in. to ⅝in. broad. *sori* very large, in a single row close to the midrib. North-west America. SYN. *Goniophlebium Scouleri.*

P. sepultum (inclosed). A synonym of *P. lepidopteris sepultum.*

P. serpens (creeping). *rhiz.* firm, wide-creeping, clothed with ferruginous scales. *sti.* firm, erect, ½in. to 3in. long. *fronds* dimorphous; barren ones round or elliptical; fertile ones longer and narrower, 4in. to 6in. long, ½in. to ⅝in. broad; under surface tomentose. *sori* large, prominent, scattered, at length covering the whole upper portion of the frond. Australia and New Zealand. Greenhouse. SYNS. *P. rupestre, Niphobolus rupestris.*

P. serpens (creeping), of Swartz. A synonym of *P. Swartzii.*

P. serrulatum (slightly saw-edged). *rhiz.* fibrillose, wide-creeping. *sti.* slender, naked, short, tufted. *fronds* 3in. to 6in. long, about ½in. broad, the upper part, occasionally the whole, almost entire, but generally pectinato-pinnatifid, with erecto-patent, rigid lobes. *sori* oblong, confluent. West Indies, &c., 1823. (H. G. F. 44, under name of *Xiphopteris serrulata.*)

P. Sieberianum (Sieber's). A synonym of *P. cyatheæfolium.*

P. sinuosum (sinuate). "*rhiz.* forming a crust which enwraps the matrix, clothed with peltate scales, black in the middle, and white round the edge, the stem arising from a conical protuberance, 1in. to 2in. long, firm, naked" (Baker). *fronds* dimorphous; barren ones 3in. to 6in. long, ½in. to 1in. broad, with an entire edge; fertile ones longer, and with a repand edge. *sori* round or oblong, large, marginal, or nearly so, immersed. Malaccas, &c. (H. S. F. 274.) SYN. *Phymatodes sinuosa.*

P. sororium (related). *rhiz.* wide-creeping, stout, with pale brown scales. *sti.* firm, naked, erect, 6in. to 12in. long. *fronds* 1ft. to 2ft. long, 6in. to 9in. broad; lower pinnæ largest, sessile, 4in. to 6in. long, about ½in. broad, with an entire or obscurely undulated edge, and an acuminate apex. *sori* in distinct rows, nearer the midrib than the edge. Cuba to Peru.

P. spectabile (remarkable). A synonym of *Nephrodium villosum.*

P. spectrum (spectral). *rhiz.* wide-creeping, woody, with deciduous, black scales. *sti.* 3in. to 4in. long, erect, naked, firm, distant. *fronds* cordate-hastate, 6in. to 9in. each way, the apex acuminate; lateral lobes rounded or acute; basal lobes deep, occasionally imbricated; edge not toothed. *sori* irregularly scattered, small, not copious. Sandwich Isles. SYN. *Colysis spectra.*

P. sporadocarpum (spore-fruited). A synonym of *P. aureum areolatum.*

P. squamatum (scaly). *rhiz.* wide-creeping, stout, clothed with adpressed scales. *sti.* erect, 6in. to 12in. long, rigid, scaly. *fronds* 6in. to 12in. long, 2in. to 4in. broad, cut nearly or quite to the rachis into entire, bluntish pinnæ, 1in. to 2in. long, about ½in. broad, with a good space between them, dilated, and frequently united at the base; rachis and under surface densely scaly. *sori* large, copious. West Indies and Mexico to Peru. SYN. *Lepicystis squamata.*

FIG. 243. FROND OF POLYPODIUM STIGMATICUM.

Polypodium—*continued.*

P. stegnogrammoides (Stegnogramma-like). *cau.* sub-arborescent. *sti.* 1½ft. to 2ft. long, erect, firm, pubescent upwards. *fronds* 2ft. to 3ft. long, 1ft. or more broad; pinnæ 6in. to 9in. long, 1½in. broad, the edge bluntly lobed about a quarter the way down, the apex acuminate; rachis and veins beneath slightly hairy. *sori* in rows near the midrib. Sandwich Isles. SYNS. *P. sandvicense, Goniopteris stegnogrammoides.*

P. stigmaticum (dotted). *rhiz.* slender, wide-creeping, fibrillose. *fronds* sub-sessile, 4in. to 5in. long, ½in. to ⅔in. broad, entire, gradually narrowed towards both ends, both sides naked. *sori* uniserial. *areolæ* fine, copious, with distinct, free veinlets. Columbia. See Fig. 243. SYN. *Anapeltis venosa.*

P. stigmosum (dotted). *rhiz.* short-creeping, with ferruginous scales. *sti.* somewhat tufted, firm, erect, lin. to 6in. long. *fronds* 1½ft. to 2ft. long, 1in. to 3in. broad, the lower part gradually narrowed, the apex acuminate, the edge entire; lower surface tomentose. *sori* very small, in several rows between the transverse veinlets, continuous, occasionally covering the whole frond except the base. North India, &c., 1823. SYN. *Niphobolus costatus.*

P. subauriculatum (slightly-eared). *rhiz.* wide-creeping, with dull brown scales. *sti.* firm, erect, 6in. to 12in. long, naked, glossy. *fronds* 2ft. to 3ft. long, 8in. to 12in. broad, decurved, oblong-lanceolate; pinnæ 4in. to 6in. long, ½in. to 1in. broad, sessile, the base rounded or auricled, the edge slightly toothed or entire. *sori* distinctly immersed, uniserial. *areolæ* in two or three rows. Himalayas, &c. SYN. *Schellolepis subauriculata.* The variety *Reinwardtii* is crenate instead of dentate.

P. subfalcatum (slightly sickle-shaped). *sti.* less than 1in. long, hairy, densely tufted. *fronds* 6in. to 9in. long, 1in. to 1½in. broad; pinnæ close, spreading, toothed one-third to half way down, decurrent at base, the lower ones gradually reduced; both surfaces slightly villous. *sori* in rows, one to each tooth. Malay Isles, 1839.

P. subpetiolatum (shortly-stalked). *rhiz.* wide-creeping, stout, with ferruginous scales. *sti.* 4in. to 6in. long, stramineous, firm. *fronds* 1ft. or more long, 6in. to 8in. broad; pinnæ 3in. to 4in. long, ½in. broad, with a slightly crenate edge and a blunt point, the lower ones rounded at base, sub-petiolate; rachis and both surfaces finely villous. *sori* in rows nearer the midrib than the edge. Mexico, &c., 1845. *P. biserratum* is, according to Mr. Baker, merely a form of this species, with much more elongated fronds, more numerous pinnæ, and more distant sori.

P. surrucuchense (Surruchu). *rhiz.* stout, densely grey-scaly. *sti.* firm, 6in. to 12in. long, glossy. *fronds* 1ft. to 2ft. long, 8in. to 12in. broad; pinnæ 4in. to 6in. long, about ½in. broad, erecto-patent, numerous, the base sub-cuneate, the edge entire. *sori* prominent, in a single series with the areolæ. West Indies to Ecuador. SYN. *Goniophlebium surrucuchense.*

P. Swartzii (Swartz's). *rhiz.* slender, wide-creeping, with ferruginous scales. *sti.* slender, ½in. to 1in. long, naked. *fronds* 2in. to 4in. long, ½in. to 1in. broad, nearly or quite uniform, gradually narrowed to both ends, with a slightly lobed or entire edge. *sori* uniserial on free veinlets. *areolæ* fine, copious, irregular. West Indies and Cayenne. SYNS. *P. serpens, Anapeltis serpens.*

FIG. 244. RHIZOME OF POLYPODIUM FILIPES, WITH FRONDS.

P. tenellum (tender). *rhiz.* woody, wide-creeping, scaly when young. *sti.* firm, 2in. to 3in. long, nearly naked, jointed near the base. *fronds* 1ft. to 2ft. or more long, 2in. to 4in. broad, pendent; pinnæ 2in. to 3in. long, ½in. broad, entire or obscurely crenated, narrowed towards both ends. *sori* in rows near the edge. Australia, &c., 1823. Greenhouse. SYN. *Arthopteris tenella. P. Filipes* is a young state of this species. See Fig. 244.

P. tenuifolium (slender-fronded). *rhiz.* stout, with reddish-brown, fibrillose scales. *sti.* slender, erect, 2in. to 3in. long. *fronds* 8in. to 12in. long, 1½in. to 2in. broad, cut to the rachis; pinnæ distant, entire or slightly crenated, linear, blunt. *sori* slightly immersed, in two rows of six to ten each to a pinna. SYN. *P. Otites.*

Polypodium—*continued.*

P. terminale (terminal). A garden form of *P. Phymatodes.*

P. tetragonum (four-angled). A synonym of *P. androgynum.*

P. thyssanolepis (fringed-scaled). *rhiz.* ¼in. long, firm, slender, wide-creeping, with dense, pale brown scales. *sti.* erect, 3in. to 12in. long, stiff, scaly. *fronds* 3in. to 9in. long, 2in. to 4in. broad, lanceolate, simply pinnate; pinnæ ¼in. to ½in. broad, blunt, entire, distant, ligulate, ascending, all except lowest (which are not reduced) dilated at base; lower surface densely clothed with minute, ciliated, brown, lepidote scales. *sori* and *areolæ* uniseriate. Mexico to Peru. SYN. *Goniophlebium thyssanolepis.*

P. trichodes (hair-like). *sti.* scaly at base, and hirsute. *fronds* 1ft. to 4ft. or more long, bi-tripinnate; segments finely divided, covered with minute, white hairs. East Indies, 1840. Greenhouse. SYN. *Phegopteris trichodes.*

P. trichomanoides (Trichomanes-like).* *sti.* short, densely tufted, deciduously hairy. *fronds* 3in. to 6in. long, about ¼in. broad, cut to the rachis; pinnæ less than one line broad, close, linear-oblong, blunt; surfaces sometimes hairy. *sori* one in each pinna, near the base. West Indies, &c., 1822.

P. trifidum (thrice-cut). *rhiz.* stout, with bright ferruginous scales. *sti.* 3in. to 6in. long, firm, erect, glossy. *fronds* 6in. to 12in. long, 6in. to 8in. broad, with a large, linear, terminal lobe, and one to five similar ones on each side, which reach down within ¼in. of the rachis, and are 4in. to 6in. long, ¼in. to 1½in. broad, narrowed to the point, the edge obscurely repand or entire. *sori* uniseriate, and one only between each main vein. *areolæ* copious, between the transverse veinlets. India, &c. SYNS. *P. oxylobum, Pleuridium oxylobum.*

P. trifurcatum (thrice-forked). *rhiz.* creeping, stout, densely scaly. *sti.* 3in. to 5in. long, close, villous, frequently bent. *fronds* 6in. to 9in. long, 1in. or more broad, with blunt, entire, broad lobes reaching from one-third to half way down. *sori* copious, mainly in two rows in each lobe, immersed. West Indies to Peru, 1820.

P. triquetrum (three-sided). *rhiz.* woody, stout, with dense, almost scarious scales. *sti.* 4in. to 8in. long, distant, firm, erect. *fronds*, barren ones 6in. to 9in. long, 2in. to 3in. broad, with an entire edge, and an acuminate apex; fertile ones rather narrower and longer. *sori* in two close rows between the main veins, five to eight between the midrib and edge, not immersed. Java. SYN. *Pleuridium triquetrum.*

P. unidentatum (once-toothed). *sti.* 1ft. long, tufted, with dark brown scales. *fronds* 2ft. to 3ft. long, 1ft. or more broad, deltoid; lower pinnæ largest, deltoid, 6in. to 9in. long, 4in. to 5in. broad; pinnules lanceolate, the lower segments distinct, ovate-oblong, deeply pinnatifid, with slightly-toothed lobes. *sori* sub-marginal. Sandwich Isles. This species is rather rare in cultivation. SYN. *Phegopteris unidentata.*

FIG. 245. CREEPING RHIZOME OF POLYPODIUM VACCINIIFOLIUM.

P. vacciniifolium (Whortleberry-leaved).* *rhiz.* very wide-creeping, slender, clothed with grey or ferruginous scales. *fronds* dimorphous, almost sessile, entire; barren ones 1in. to 2in. long, ¼in. to ½in. broad, roundish or elliptical, obtuse; fertile ones linear or ligulate. *sori* large, uniseriate. Jamaica to Paraguay. See Fig. 245. SYN. *Lopholepis vaccinifolia.*

P. vacillans (changing). A synonym of *P. loriceum latipes.*

Polypodium—*continued.*

P. venosum (veined). A synonym of *P. lycopodioides.*

P. venustum (charming). A synonym of *P. himalayense.*

P. verrucosum (warted).* *sti.* firm, erect, 1½ft. to 2ft. long, terete, naked. *fronds* 3ft. to 4ft. long, 1ft. broad; pinnæ 6in. to 8in. long, ½in. to ¾in. broad, entire; rachis and both surfaces sometimes slightly hairy. *sori* confined to the inner row of areolæ, firm, immersed, forming very distinct papillæ on the upper side. Philippines and Malaccas. (H. G. F. 41.) SYN. *Schellolepis verrucosa.*

FIG. 246. POLYPODIUM VULGARE, showing Habit and Under Surface of Portion of detached Frond.

P. vulgare (common). Adder's Fern; Brake-root; Golden Maidenhair; Wall Fern; Wood Fern. *rhiz.* stout, with bright ferruginous scales. *sti.* firm, erect, 2in. to 4in. long, stramineous. *fronds* 6in. to 12in. long, 3in. to 6in. broad, cut nearly or quite to the rachis; pinnæ ¼in. to ½in. broad, close, entire or slightly toothed, usually blunt. *sori* large, uniseriate. Temperate regions (Britain, &c.). See Fig. 246. Of this species, there are many varieties. The following are the most desirable.

P. v. auritum (eared). This differs from the type in being auriculate at the base of the pinnæ, on the upper, the lower, or both, margins. The fronds are 10in. to 15in. long, and over 2in. wide.

P. v. bifidum (twice-cut). A variety with fronds 10in. to 15in. high and 3in. wide, with the lobes forked, or sometimes bifurcate.

FIG. 247. FROND OF POLYPODIUM VULGARE CAMBRICUM.

Polypodium—*continued.*

P. v. cambricum (Welsh).* *fronds* 12in. to 20in. long, 4in. to 8in. wide, broadly ovate, bipinnatifid; pinnæ ovate-lanceolate; pinnules imbricated, and serrated on the margins. One of the earliest-known, best, and most distinct, forms. See Fig. 247.

P. v. compositum (compound). *fronds* 1ft. to 1½ft. long, about 4in. wide; some of them furcate on the points of the pinnæ, others partly forked and partly serrate, others much enlarged, and sometimes eared.

P. v. cristatum (crested). *fronds* about 15in. long, 3in. to 4in. wide, the apex bifid, each branch again forking, and often becoming crested; points of all the pinnæ crested and curled. A handsome and very distinct variety.

FIG. 248. POLYPODIUM VULGARE ELEGANTISSIMUM.

P. v. elegantissimum (most elegant).* A form with very finely-divided fronds. See Fig. 248.

P. v. marginatum (margined). *fronds* about 1ft. long, linear-lanceolate; pinnæ unequally, sometimes deeply, serrate.

P. v. multifido-cristatum (multifid-crested). A form with fronds 6in. to 10in. long, 3in. of which have only a narrow wing on each side of the stipes, but they are much forked upwards, and produced in a dense, multifid crest.

P. v. omnilacerum (wholly-torn). *fronds* pinnatifid; pinnæ deeply lobed, similar to *cambricum*, but the lobes are not imbricated, and the tip of each pinna is more lengthened out. A handsome and rare variety.

P. v. pulcherrimum (very beautiful). *fronds* 1ft. or more long, about 6in. wide, very similar to those of *cambricum*, the apex deeply serrated. A grand variety.

P. v. semilacerum (half-torn). *fronds* 1ft. to 1½ft. long, 5in. to 6in. wide, below deeply bipinnatifid, pinnate towards the apex; pinnæ irregularly toothed. Ireland. A handsome form.

P. v. suprasoriferum (sori-bearing above). *fronds* 10in. to 12in. long, narrow. *sori* frequently produced at the margins of the upper surface. South of England. A very singular and rare plant.

P. v. variegatum (variegated). A pretty, but somewhat uncertain, form, distinctly spotted and striped with whitish-yellow.

P. Wildenovii (Wildenow's). A synonym of *P. propinquum.*

POLYPODY. *See* **Polypodium.**

POLYPORUS (from the Greek *polyporus*, having many outlets; in allusion to the many openings or pores on the lower surface of the pileus). A genus of Fungi, belonging to the *Hymenomycetes*, or those in which the spores are formed on the tips of small projections from larger cells (of which each gives off four spores) on the surface (hymenium) of a definite part of the Fungus. *See* **Mushrooms.** The species of *Polyporus* differ from the true Mushrooms in that, while the latter bear the hymenium on the gills, the former bear it in a number of small tubes packed together to form a layer of peculiar aspect and texture on the lower surface of the cap, or pileus. They are usually dry and hard in texture, after a short time, and are rather long lived. They, at first, emit an acid smell, but afterwards are nearly without smell. They vary in form, and grow indefinitely. Those parasitic on trees usually have the pileus sessile, and fixed

Polyporus—*continued.*

by one side to the trunk of the tree. They often continue to grow slowly for many years, and reach a size of from 1in. or 2in. to 3ft. across, by several inches in thickness in the middle. From their dry texture, it is easy to preserve them as herbarium specimens; but insects are very apt to eat and destroy them when dried. Old trees of various kinds very frequently have Fungi of this genus growing on their stems, the mycelium penetrating and drawing nourishment from the wood, and the pileus often remaining for many years on the stem, very often near its base. It seems probable that the species of *Polyporus* do not live on quite healthy trees, but on those already weakened by some other cause. Our knowledge of their importance as parasites is due largely to R. Hartig, the well-known authority on the diseases of forest-trees. He has traced and described the effects produced by *P. annosus*, Fr. (under the name of *Trametes radiciperda*), on various trees, by *P. fulvus* on the Silver Fir, by *P. borealis* on the Spruce, by *P. vaporarius* on Spruce and Firs, by *P. mollis* on Firs, by *P. igniarius* on numerous forest-trees (Dicotyledons) and fruit-trees, by *P. dryadeus* on Oaks, and by *P. sulphureus* on many forest-trees (Dicotyledons) and on Pear-trees. Numerous other instances of parasitism could be added. Further details need not here be entered into, it being sufficient to say that the species of *Polyporus* are not of frequent occurrence in gardens and pleasure-grounds. The wood diseased by the presence of the Fungus becomes soft and rotten, and a tree infested with *Polyporus* may be regarded as doomed, sooner or later, to perish from the action of the Fungus on the wood. It is well, if the tree can be at once removed, to cut it down and have it used as firewood, rather than to allow the Fungus to distribute its myriads of spores to injure other trees.

POLYPREMUM (of Adanson). A synonym of **Valerianella** (which *see*).

POLYPTERIS (of Nuttall). Included under **Palafoxia** (which *see*).

POLYSPORA. Included under **Gordonia** (which *see*).

POLYSTACHYA (from *poly*, many, and *stachys*, a spike; alluding to the inflorescence of some of the species). SYNS. *Encyclia, Epiphora.* ORD. *Orchideæ.* A genus comprising about forty species of stove, epiphytal orchids, mostly tropical and South African, a few being found in India, Malaya, and tropical America. Flowers usually small; sepals connivent or almost spreading, the dorsal one free, the lateral ones sometimes much broader, adnate to the foot of the column; petals similar to the dorsal sepal, or narrower; lateral lobes of lip somewhat prominent, erect, the middle one spreading or recurved, and undivided; column sometimes very short; pollen masses, four; racemes many, short, forming a loose, narrow panicle, or solitary and simple, on a leafy stem; peduncle terminal. Leaves few, distichous, oblong or narrow, base contracted into a sheath. The species are rather interesting plants. Those best known to cultivation are described below; they require culture similar to **Burlingtonia** (which *see*).

P. bracteosa (bracted). *fl.* yellow; sepals brown at base; lip broadly oblong, revolute, the lateral lobes brown within; bracts lanceolate, acuminate, concave, at length leafy; raceme nodding, pubescent. *l.* solitary, petiolate, oblong-ovate, acute. Pseudo-bulbs almost round, compressed, aggregate. Sierra Leone, 1838. (B. M. 4161.)

P. galeata (helmet-shaped). *fl.*, perigone green, spotted with red; sepals mucronate; petals minute, oblong-spathulate; lip greenish-white, fleshy, trilobed, the middle lobe cordate, acute; peduncles terminal, generally one-flowered. *l.* linear-oblong, fleshy. Pseudo-bulbs small, one-leaved. Sierra Leone, 1837. (B. M. 3707, under name of *P. grandiflora.*)

P. hypocrita (hypocritical). *fl.* light green, with a few brown spots at the base of the blunt chin; lip whitish, mealy, the middle lobe very much crisped. Western tropical Africa, 1882. This species is very similar to *P. luteola*, but larger.

Polystachya—*continued.*

P. lineata (lined). *fl.* greenish, striped with brown, minute, disposed in spikes. *l.* linear-ligulate. Pseudo-bulbs pyriform. Guatemala, 1870. (Ref. B. 80.) The Mexican variety, *elatior*, is rather larger in all its parts. (Ref. B. 81.)

P. luteola (yellowish). *fl.* yellowish-green, minute, disposed in oblong, remote, dense-flowered spikelets, 1in. to 3in. long. *l.* oblong-lanceolate, acute, plicate, many-nerved, sheathed at base, distichous, shorter than the scape, recurved at apex. Stem thickened at base. Mexico, 1818. (H. E. F. 103.) SYN. *Dendrobium polystachyon* (L. B. C. 428; L. C. B. 20).

P. puberula (puberulous). *fl.* green, pubescent, disposed in paniculate, thyrsiform spikes. *l.* lanceolate, seven-nerved, longer than the scape. Pseudo-bulbs ovate. Sierra Leone, 1822. (B. R. 851.)

P. pubescens (pubescent). *fl.* bright yellow, streaked with red, few, fragrant, terminating an ancipitous, flexuous scape; lip small, trident-shaped, bearded on the inside with long hairs. *l.* binate, oblong-linear, flat. Delagoa Bay, 1838. (B. M. 5586.) SYN. *Epiphora pubescens.*

P. rufinula (reddish). *fl.* in a few-flowered, simple, slightly hairy raceme; sepals cinnamon-brown outside, greenish inside, washed with light brown on the borders; petals greenish, with brown tips; lip yellowish on disk, the front borders light purple, with a rather long ridge, and the furfuraceous surface caused by fragile hairs. *l.* narrow-ligulate, blunt, in pairs at the flowering season. Pseudo-bulbs stick-like, thickened at base, 2in. or less long. Zanzibar, 1879.

POLYSTICHUM. Included under **Aspidium** (which *see*).

POLYTÆNIUM. Included under *Antrophyum.*

POLYTHRIX. A synonym of **Crossandra** (which *see*).

POLYXENA (named after Polyxena, the daughter of Priam, beloved by Achilles). SYNS. *Manlilia, Polyanthes* (of Jacquin). ORD. *Liliaceæ.* A genus comprising about seven species of greenhouse, South African, bulbous plants, included, by Mr. Baker, as a section of *Massonia.* Flowers sometimes very short, sometimes long, loosely spicate or racemose; perianth tube cylindrical or slightly swollen above; lobes six, sub-equal, much shorter than the tube; scape simple below the inflorescence, short; racemes frequently shorter than the leaves. Radical leaves two, spreading or erect, sub-sessile or petiolate. *P. odorata* and *P. pygmæa*, the only species which call for mention here, require culture similar to **Massonia** (which *see*).

P. odorata (odorous). *fl.* white, small, Hyacinth-like, deliciously sweet-scented, disposed in a dense corymb, which is seated between the pair of leaves. October. *l.* erect, lanceolate, 3in. to 5in. high. 1871. A pretty plant. (B. M. 5891, under name of *Massonia odorata.*)

P. pygmæa (pigmy). This is the correct name of the plant described in this work under name of *Massonia ensifolia.*

POLYZONE. A synonym of *Darwinia.*

POMACEÆ. Included under *Rosaceæ.*

POMADERRIS (from *poma*, a lid, and *derris*, a skin; alluding to the membranous covering of the capsule). ORD. *Rhamneæ.* A genus comprising eighteen species of greenhouse, evergreen shrubs, natives of the Southern or Eastern regions of Australia, or of New Zealand. Flowers pedicellate, in small, umbel-like cymes, usually forming terminal panicles or corymbs, or rarely solitary in the axils of the leaves; calyx five-lobed, deciduous or reflexed; petals concave or nearly flat, or none. Leaves alternate, penni-veined; under surface, as well as the branches, white, hoary, or rusty with tomentum, often mixed with, or concealed by, silky hairs. The species thrive in a compost of peat and sandy loam. Propagation may be effected by cuttings of half-ripened shoots, cut to a joint, dried at the base, and inserted in sand, under a glass.

P. andromedæfolia (Andromeda-leaved). A synonym of *P. phillyreoides.*

P. apetala (apetalous).* Victorian Hazel. *fl.* greenish, small, and very numerous, in loose, oblong, thyrsoid panicles, leafy at the base; calyx stellately hairy; petals none. June. *l.* petiolate, ovate-lanceolate or broadly oblong, obtuse or rarely acute, 2in. to 4in. long, irregularly crenulate, glabrous, but rough and much

Pomaderris—*continued.*

wrinkled on the upper side; principal veins very prominent beneath. *h.* 3ft. to 6ft. 1803. SYN. *P. aspera.*

P. aspera (rough). A synonym of *P. apetala.*

P. betulina (Birch-like).* *fl.* pale yellow, nearly sessile, in dense, globular heads, solitary or two or three together, on short, axillary or terminal peduncles; calyx densely hairy; petals none. *l.* oblong or obovate, obtuse, seldom above 1in. long. A slender shrub or small tree, with elongated branches. (B. M. 3212.)

P. discolor (two-coloured). A variety of *P. elliptica.*

P. elliptica (elliptic). *fl.* pale yellow; calyx white-tomentose; petals usually broadly cordate or nearly orbicular, concave, on slender claws, often narrower, occasionally abortive; cymes numerous, in dichotomous panicles. June. *l.* petiolate, ovate, oblong or ovate-lanceolate, obtuse or rarely acute, usually 2in. to 3in. long, entire or with margins slightly waved, white-tomentose beneath. *h.* 6ft. 1805. (B. M. 1510.) The variety *discolor* has the calyx tube less silky-hairy, and the leaves often less obtuse.

P. ericifolia (Heath-leaved). A synonym of *P. phylicifolia.*

P. lanigera (woolly). *fl.* pale yellow; calyx tube half as long as the lobes; petals ovate, concave, on slender claws; panicles often larger and less corymbose than in *P. elliptica.* April. *l.* oblong or ovate-lanceolate, the under side, as well as the young branches, clothed with soft, often rusty, tomentum. *h.* 3ft. 1806. (B. M. 1823.) SYN. *Ceanothus laniger* (A. B. R. 569).

P. ledifolia (Ledum-leaved). *fl.* pale yellow, few, in small, loose, shortly pedunculate cymes in the upper axils; calyx tube very short; petals narrow, slightly concave. April. *l.* narrow, oblong, obtuse, about ¼in. long, entire, glabrous above, white beneath, the margins slightly recurved. *h.* 2ft. 1824.

P. phillyreoides (Phillyrea-like). *fl.* pale yellow, variable in size; cymes compact, in small, terminal panicles; calyx tube shorter than the lobes; petals similar to those of *P. elliptica,* but usually narrower. April. *l.* seldom 1½in. long, oblong or oval, obtuse or acute, entire, firm, glabrous or minutely hoary above, softly white or rusty-downy beneath. *h.* 2ft. 1818. SYN. *P. andromedæfolia* (B. M. 3219).

P. phylicifolia (Phylica-leaved). *fl.* pale yellow, small and few, in little, loose cymes in the upper axils, the upper ones forming thyrsoid, leafy panicles; petals none. April. *l.* narrow or linear-oblong, nearly sessile, seldom above ¼in. long; margins much revolute; under surface white-tomentose, upper surface hairy; leaves sometimes broader, and nearly flat. *h.* 2ft. 1819. (L. B. C. 120.) SYN. *P. ericifolia.*

P. vacciniifolia (Whortleberry-leaved). *fl.* cream-colour; cymes small, in ovoid, terminal panicles of about 1in. in length; calyx tube very short; petals broad. *l.* ovate or nearly orbicular, very obtuse, seldom above ¼in. long, glabrous above, white on the under surface. 1869.

POMARIA (named after Pomar, physician to Philip III. of Spain). ORD. *Leguminosæ.* A genus comprising five or six species of greenhouse, unarmed trees or shrubs, more or less black-dotted, mostly extra-tropical South American, and now included, by Bentham and Hooker, under *Cæsalpinia.* Calyx segments entire or at length loosely glandulose-fimbriate. Pods oblong or lanceolate, oblique or falcate, glandulose. Leaflets usually small, coriaceous. For culture of *P. glandulosa,* the only species introduced, *see* **Cæsalpinia.**

P. glandulosa (glandular). *fl.* yellow, disposed in axillary racemes; petals five, shortly unguiculate. May. *l.* abruptly bipinnate; stipules pinnatifid. *h.* 2ft. New Spain, 1826. The branches, calyx, and corolla, are glandular.

POMATOCALPA. A synonym of *Cleisostoma.*

POMAX (from *poma,* an operculum; referring to the operculum of the fruit). ORD. *Rubiaceæ.* A monotypic genus. The species is a small, greenhouse, branched, hirsute or glabrous under-shrub. It only differs from **Opercularia** (which *see* for culture) "in the simple flower-heads forming an umbel, instead of being united in a compound head" (Bentham).

P. hirta (hairy). A synonym of *P. umbellata.*

P. umbellata (umbelled). *fl.* greenish-white, disposed in a terminal, sessile umbel within the last leaves; corolla about ⅛in. long. July. *l.* petiolate, ovate, elliptical, or lanceolate, mostly under ½in. long, or rather more when narrow. *h.* not more than 1ft. Australia, 1826. SYNS. *P. hirta, Opercularia umbellata.*

POMBALIA. Included under *Ionidium.*

POME. A fleshy, many-celled fruit, *e.g.,* an Apple.

POMEÆ. A tribe of *Rosaceæ.*

POMEGRANATE (*Punica Granatum*). A deciduous tree, which ranges from 15ft. to 20ft. in height, and has numerous, slender branches some being armed with sharp thorns. It is a native of Cabul and Persia, and is probably wild in North-west India; it is very commonly cultivated throughout the warmer regions of the globe. The fruit of the Pomegranate will be remembered in connection with Scripture history, where it is mentioned in conjunction with that of the Vine, Fig-tree, Olive, &c. The cultivation of the tree dates back, therefore, to remote antiquity: it is said to have been introduced to this country before 1600, and to have been cultivated by Gerarde. Although such an old occupant of our gardens, it is very seldom that fruits are ripened. The fruits "are generally about the size of the fist, and have a tough, leathery rind, of a beautiful deep golden colour, tinged with red, and are crowned with the remains of the calyx lobes" ("Treasury of Botany").

FIG. 249. FRUITING BRANCHLET OF POMEGRANATE.

See Fig. 249. As an ornamental tree, the Pomegranate is much prized in the South of Europe, and in many Eastern countries; but in Britain even its flowering is chiefly limited to the most exceptionally favoured localities. There is a double-flowered variety, and considerable variation of colour exists amongst those both with single and double flowers. The flowers are produced on the ends of branches made annually, sometimes singly, at others three or four together; generally, where they appear at all, a succession is kept up from about June until September. In inland and northern districts, the Pomegranate should be grown against a south wall, or in a tub or large pot in a greenhouse. A rich, loamy soil is that best suited to its requirements. Single varieties may be raised from seeds, and all varieties increased by cuttings, suckers, layers, or by grafting, using the common sort as a stock.

PONCELETIA. A synonym of **Sprengelia** (which *see*).

PONDWEED. *See* **Potamogeton.**

PONERA (from *poneros,* miserable; referring to the appearance of the species). SYN. *Nemaconia.* ORD. *Orchideæ.* A genus comprising six or seven species of stove, epiphytal orchids, natives of Central America and Mexico. Flowers rather small, axillary, in tufts upon the young leafy or the old leafless stems; sepals erect, fleshy, the lateral ones largest, and connate with the elongated foot of the column; petals free; lip naked, two-lobed, wedge-shaped, articulate with the foot of the column, which is short and terete; anther membranous, four-celled, containing four pollen masses, adhering in pairs by means of two powdery caudicles. Leaves alternate, in two rows, almost grass-like. The species introduced—*amethystina, graminifolia, Kienastii, leucantha, macroglossa, pleurostachys,* and *striata*—are all of botanical interest only.

PONGAMIA (*Pongam* is the Malabar name of *P. glabra*). SYN. *Galedupa.* ORD. *Leguminosæ.* A monotypic genus, the species being a stove, evergreen tree. For culture, *see* **Dalbergia.**

P. glabra (smooth). Kurrung or Poonga Oil-plant. *fl.* having a white corolla, and a red calyx, in loose, axillary racemes, 3in. to 5in. long. *l.* smooth, alternate, pinnate; leaflets five or seven, egg-shaped or broadly elliptical. *h.* 5ft. to 10ft. East Indies, North Australia, &c., 1699. From the seeds of this tree, an oil, called Kurunji, or Poonga Oil, is extracted in India, and greatly used for mixing with lamp oil, or, by the poorer classes, for burning without any admixture.

PONTEDERIA (named after J. Pontedera, 1688-1757, once Professor of Botany at Padua). Pickerel Weed. SYN. *Unisema.* ORD. *Pontederiaceæ.* A genus comprising seven or eight species of stove or hardy, aquatic plants, with stem-like or creeping rhizomes, all natives of North or South America. Flowers numerous, usually crowded at the sides of a rachis, scarcely pedicellate, the inflorescence terminal, compound, and densely cylindrical, rarely almost simple and racemiform; perianth funnel-shaped, with an incurved, slender or rarely abbreviated tube; stamens six. Radical leaves long-stalked, cauline ones short-stalked; all cordate, ovate, rotundate, or rarely lanceolate, with a long, loose sheath below the petiole. Stems (or branches) erect, simple, one-leaved. The best-known species is *P. cordata;* this is described as one of the handsomest hardy aquatic plants in cultivation. It is perfectly hardy, and should be planted in water from 6in. to 12in. in depth. Propagated by division, at almost any season.

P. angustifolia (narrow-leaved). A variety of *P. cordata.*

P. azurea (azure). A synonym of *Eichhornia crassipes.*

FIG. 250. UPPER PORTION OF PLANT OF PONTEDERIA CORDATA.

P. cordata (heart-shaped). *fl.* sky-blue, sometimes white, with a greenish spot on the inside of the upper lobe, in spikes, numerous, small. Summer and autumn. *l.* thick, on long stalks, lively green; petioles dilated, and sheathed at the base. *h.* 1½ft. to 2ft. North America, 1579. See Fig. 250. (B. M. 1156.) *P. angustifolia* is a variety with narrow-lanceolate leaves, cordate at the base, and also with smaller, bright blue flowers. SYN. *P. lanceolata* (L. B. C. 613).

Pontederia—*continued.*

P. dilatata (extended). A synonym of *Monochoria hastata.*

P. lanceolata (lance-shaped). A synonym of *P. cordata angustifolia.*

PONTEDERIACEÆ. A small natural order of erect or floating, aquatic herbs, mostly American, rare in tropical Asia and Africa, absent in Europe. Flowers hermaphrodite, scarcely irregular, or sometimes regular, fasciculate or scattered at the sides of a simple or branched rachis, racemose, spicate, or sub-paniculate, terminal, in a sessile or pedunculate sheath; perianth inferior, free of the ovary, the tube evolute or rarely absent; lobes (rarely segments) six, more or less distinctly biseriate; stamens six or three; filaments free; ovary three-celled. Perfect leaves on a rhizome or floating stem, long-stalked; blade floating or emersed; submersed leaves sometimes reduced to linear petioles (without a blade). *Pontederia vaginalis* is used in various forms as medicine in Japan. The order comprises four genera—*Eichhornia, Heteranthera, Monochoria,* and *Pontederia*—and scarcely thirty-five species.

PONTHIEVA (named in honour of M. de Ponthieu, a French West Indian merchant, who sent a number of plants to Sir Joseph Banks). ORD. *Orchideæ.* About ten species have been referred to this genus. They are curious, stove, terrestrial, glabrous or pilose orchids, with tufted roots, dispersed over the warmer parts of America, from Brazil as far as the Southern United States. Flowers mediocre, shortly pedicellate, disposed in loose, often glandular-pubescent racemes; sepals free, spreading; petals narrower, adnate to the column; lip posterior, adnate to the base of the column, the lamina abruptly dilated, spreading; column beaked; pollen masses bilobed; scapes elongated, simple. Leaves sub-radical, ovate or lanceolate, more or less stalked, membranous. The species known in gardens are described below. They thrive in a compost of sandy loam and peat, and require to be kept dry when at rest. Ample drainage must be provided.

P. glandulosa (glandular). *fl.* bright green, with the edges of the petals white; lateral sepals flat; dorsal one loosely agglutinate, with the petals in a rhomboid, tridentate lamina. *l.* cuneate-oblong, narrowed into a short petiole. Stem about 1ft. high. West Indies, &c., 1800. (B. M. 842, under name of *Neottia glandulosa.*)

P. maculata (spotted).* *fl.* widely spreading, ⅜in. across; dorsal sepals pale brown, with darker streaks, ovate-lanceolate; lateral ones white, with brown spots, twice as large; petals yellow, with red-brown streaks, dimidiate-oval, parallel, clawed; scape stout, erect, bearing a loose, raceme-like spike. March. *l.* 1ft. long or less, sessile or narrowed into petioles, elliptic-lanceolate to narrowly oblong-lanceolate, acuminate, pale green. *h.* above 1ft. Columbia, &c. Whole plant covered with long, flaccid hairs. (B. M. 6637.)

P. petiolata (petioled). *fl.* yellowish-cinnamon in colour; lateral sepals with revolute margins; dorsal one forming, with the petals, an oblong, undivided lamina. *l.* ovate-oblong, shorter than the petioles, with crisped margins. Stem 1½ft. high. St. Vincent, 1822. (B. R. 760; L. B. C. 1190.)

PONTIA. A generic name employed, in some works, instead of *Pieris,* for the White Butterflies. *See* **Cabbage Caterpillars.**

POPCORN. A variety of *Zea Mays.*

POPE'S HEAD. A common name for *Melocactus communis.*

POPLAR. *See* **Populus.**

POPPY. *See* **Papaver.** The name is also applied to several members of other genera.

POPPY, CALIFORNIAN. *See* **Platystemon californicus.**

POPPY, CORN. *See* **Papaver Rhœas.**

POPPY, HORNED. *See* **Glaucium.**

POPPY-MALLOW. *See* **Callirhoe.**

POPPY, OPIUM. *See* **Papaver somniferum.**

POPULUS (the ancient Latin name = *palpulus*, akin to *palpitare*, to tremble; probably so called from its trembling leaves). Poplar. ORD. *Salicineæ*. A well-known genus of hardy, deciduous trees, with terete or angular branchlets, and having scaly buds, covered with resin; eighteen species have been described, natives of Europe, Central or mountainous and Northern Asia, and North America, including Mexico. Catkins loose, appearing before the leaves, the males often pendulous; flowers of both sexes usually shortly pedicellate, the females sometimes on an elongated pedicel, racemiform. Leaves alternate, sometimes on laterally compressed, tremulous petioles, usually broad, penniveined, and trinerved at the base, entire, toothed or lobed; stipules narrow, membranous, fugacious. Some of the Poplars are amongst the most rapid growers of all hardy forest-trees. They thrive under a variety of conditions as regards soil, &c., but do best in damp situations, such as along watercourses, &c. All are readily increased from cuttings, inserted in the open ground; soon after the leaves have fallen is the best time to do this. The weeping forms are generally grafted on tall, straight stems of the common upright-growing ones.

Fungi. Many kinds of Fungi live on dead branches and stems of Poplars, and a good many also on living parts; but the only one of the latter that is usually very noticeable in gardens is that known as *Exoascus aureus* (*Taphrina aurea*). This Fungus produces very conspicuous spots on the leaves of *Populus nigra*. These spots bulge on one surface, usually the upper, so as to appear almost hemispherical, and may be from ¼in. across up to a much larger size, when two or more fuse together. The spots are usually duller green above, bright golden-yellow below; but sometimes the yellow colour is on the upper surface. The microscope shows that the colour is due to a layer of rather long cells, fixed to the surface cells of the leaf by one end, but free in the rest of their length. Each is full of a large number of small, round cells or spores, which escape by bursting the wall of the containing cell. When abundant, this Fungus is very conspicuous from its colour, and is very hurtful to the young trees, which it chiefly affects.

The best remedy is the removal and destruction of the leaves, or of the branches, and even the whole trees if much infested, as soon as the Fungus appears. Perhaps the application of solutions of potassium sulphide or potassium permanganate might destroy the Fungus.

Insect Pests. Poplars are liable to the ravages of a considerable variety of insects, mostly beetles and moths. A number of them are described elsewhere, and these species are merely mentioned here, the reader being referred to the fuller information given under the headings quoted. The wood of the trunks is bored into by the Poplar

FIG. 251. POPLAR HORNET CLEARWING MOTH (*Sesia apiformis*).

Hornet Clearwing Moth (*Sesia apiformis*, see Fig. 251), the larvæ of which live for about two years in the trees. *See* **Sesia.** The larvæ of the **Goat Moth** (which *see*) are even more destructive. The young branches and the twigs are bored into by the larvæ of certain beetles

Populus—*continued.*

of the genus *Saperda*. The insects are rather slender, and nearly cylindrical, and of the general form shown in Fig. 252. *S. carcharias* is about ⅝in. to 1¼in. long, dusky-black, with grey or yellow pubescence, and rather long antennæ ringed with grey and black; the wing-cases are narrowed towards the tips. *S. populnea* is about ½in. long, black, slightly hairy, and marked with pits over the surface; the thorax bears three yellowish lines; the wing-cases are not narrower behind; they are covered with a yellowish pile, and bear three or four large, yellowish spots; the antennæ are ringed with ashy-grey and black. The larvæ of this species live in

FIG. 252. A, SAPERDA POPULNEA, natural size; B, BRANCH OF POPLAR, showing ravages committed by it.

gall-like swellings in the branches (see Fig. 252) of Poplars and of Willows. There are a few other species of *Saperda*, but they do not call for special mention. Branches tenanted by the larvæ (shown by their galled or withered state) should be cut off; this is usually sufficient to kill the larvæ, but it is well to have the branches burned.

The leaves are devoured by several beetles of the family *Chrysomelidæ*—the leaf-eating beetles *par excellence*. *Lina Populi* is frequently very abundant on Poplars. This beetle is nearly ½in. long, oval, and shining blue-black; the wing-cases red, except a black tip, and very finely pitted; feet, and tips of antennæ, black. The larvæ are shaped much like those of *Coccinella* (*see* **Ladybird**); the head, the hinder part of the body, and the legs, are black; the rest of the body is

Populus—*continued.*

pale, with rows of black, bristly warts. The larvæ, when touched, emit an ill-smelling, milky fluid. The pupæ are suspended from the leaves by the tail, and are coloured like the larvæ. The larvæ feed in groups on the leaves, gnawing them into holes, so that only the network of veins is left. *L. Tremulæ* is a nearly allied species common in some localities. It agrees with *L. Populi*, except in being slightly smaller and greenish-blue, with the wing-cases coarsely pitted, more yellowish-red, and not tipped with black; and the antennæ are tipped with brown. Another nearly allied insect, of similar habit, is *Phratora vitellinæ*. The same remedies may be employed against all the three species. *See* **Phratora.**

Numerous species of Sawflies (chiefly of the genus *Nematus*) feed, as larvæ, on Poplars, and most of these feed on Willows also; but none of them have been observed to do damage enough to require special measures to be taken against them. The same may be said of those *Lepidoptera* that feed, as larvæ, on the leaves of Poplars. If any remedy is required, hand-picking, or mere shaking them off the branches, is usually sufficient. Further information in regard to several of them is given under the following heads: **Lackey Moth, Liparis, Puss Moth, Sphingidæ** (Poplar Hawk Moth), and **Tussock Moths**; though, under several of these heads, Poplars are not specially mentioned in connection with the insects, which, in these instances, feed on many kinds of plants. In addition to these, a very large number of moths live on Poplars, but do not call for mention individually.

Poplars, including among them the Aspen, bear galls of various forms. Among the commonest of these are the hard, pea-like swellings on the leaf-stalks, formed by a midge (*Diplosis Tremulæ*); the rather conical, hollow galls on leaf-stalks, tenanted by Aphides (*Pemphigus bursarius*); the curious, spirally-twisted leaf-stalk galls of another kind of Aphides (*Pemphigus spirothecæ*); and the mite galls of Aspens, which vary in size from the galls of *Heliaczeus Populi* (about the size of pin-heads, at the base of the leaf-blade) to those of *Batoneus Populi*, which form masses, up to 3in. in diameter, on the young twigs or the trunk—fleshy, and green or red when fresh, but becoming hard, dry, and friable. These mite-galls are, in reality, the work of mites of the genus *Phytoptus* (*see* **Mites**), though the galls have received special names. Galls of all kinds do comparatively little harm to the trees, except rendering them unsightly. They should be cut off and destroyed, if it is desired to free the trees from them

P. alba (white).* Abele; White Poplar. *fl.*, catkins 2in. to 4in. long, females shorter. March and April. *l.* on the branches 1in. to 3in. long, broadly ovate-cordate, sinuate-lobed, glabrous in age; petioles very short, slender, compressed; leaves on the suckers, which are numerous, deltoid-ovate, lobed and toothed, 2in. to 4in. in diameter. Branches spreading; buds cottony. *h.* 60ft. to 100ft. Northern hemisphere (Britain). The wood of this tree is white in colour, light, and useful, but does not burn easily. (Sy. En. B. 1299.)

P. a. Bolleana (Bolle's).* A remarkable form, of columnar or pyramidal habit, the counterpart (under *P. alba*) of the Lombardy Poplar. (G. C. n. s., xviii. 557.)

P. a. canescens (hoary). Grey Poplar. *l.* of the branches hoary beneath or glabrous; those of the suckers, angled and toothed. The wood of this variety is said to be superior to that of the type. See Fig. 253. (Sy. En. B. 1300.)

P. angulata (angular). A synonym of *P. monilifera.*

P. balsamifera (balsam-bearing).* Balm of Gilead; Balsam Poplar; Tacamahac. *l.* ovate, gradually tapering, and pointed, finely serrate, smooth on both sides, whitish, and reticulately veined beneath. Branches round; buds large, copiously varnished with fragrant resin. *h.* 70ft. North America, 1692.

P. b. candicans (whitish). *l.* broader, and more or less heart-shaped, pointed, serrate; petioles usually hairy. SYN. *P. macrophylla.*

P. b. laurifolia (Laurel-leaved). *l.* oval, oblong, and long-acuminate or lanceolate, sometimes sub-cordate, toothed; younger ones (and branches) slightly pilose. Siberia. SYN. *P. laurifolia.*

Populus—*continued.*

P. b. suaveolens (sweet-smelling). *l.* broadly elliptic, acuminate, obtuse, toothed, slightly pubescent on the nerves and petioles. Rocky Mountains.

P. b. viminalis (twiggy). *l.* long-lanceolate. Branches angular, elongated, slender.

P. canadensis (Canadian). A synonym of *P. monilifera.*

P. c. aurea (golden). A synonym of *P. monilifera aurea.*

P. dilatata (dilated). A synonym of *P. nigra pyramidalis.*

P. fastigiata (pyramidal). A synonym of *P. nigra pyramidalis.*

P. græca (Grecian). A synonym of *P. tremuloides.*

P. grandidentata (large-toothed). *fl.*, male catkins 3in. to 4in. long; females 1½in. to 2in. long. March. *l.* roundish-ovate, with large and irregular, sinuate teeth, when young 2in. to 3in. long, densely covered with white silky wool, at length smooth on both sides, 1in. to 3in. long. Branches and branchlets cylindrical; buds pubescent, sometimes slightly glabrous. *h.* 60ft. North America, 1772. (E. T. S. M. ed. ii. 278.) Of this species there is a weeping variety (*pendula*) in cultivation.

FIG. 253. PORTION OF BRANCH AND MALE CATKIN OF POPULUS ALBA CANESCENS.

P. heterophylla (variable-leaved). *fl.*, male catkins thick, 3in. to 4in. long, dense; females 2in. long, loose. March. *l.* 6in. to 12in. long, 4in. to 8in. broad, cordate or roundish-ovate, obtuse, serrate, white-woolly when young, at length nearly smooth, except on the elevated veins beneath. Branches round, pale; buds highly pubescent, thick, short, obtuse. *h.* 40ft. to 60ft. North America, 1765.

P. laurifolia (Laurel-leaved). A synonym of *P. balsamifera laurifolia.*

P. macrophylla (large-leaved), of Lindley. A synonym of *P. balsamifera candicans.*

P. monilifera (beaded).* Necklace Poplar. *l.* on young plants and suckers, heart-shaped, 7in. to 8in. long and wide; those on full-grown trees, only one-fourth that size, and commonly without the sinus; all crenate-serrate, or with obtuse, cartilaginous teeth. Branches acutely angular or winged. *h.* 80ft. or more. North America, 1738. SYNS. *P. angulata, P. canadensis.*

P. m. aurea (golden). A very useful, ornamental tree, only differing from the type in the decided golden-yellow tint of the leaves. SYN. *P. canadensis aurea.*

P. nigra (black).* Black Poplar. *fl.*, male catkins 2in. to 3in. long, cylindrical; females shorter, ascending, the peduncle curved in front. April. *l.* 1in. to 4in. long, rhombic, deltoid, or sub-orbicular, finely crenate-serrate, the angles rounded, acuminate; young ones silky beneath and ciliate; petioles slender, compressed. Branches greenish-white; branchlets pubescent when young, and, as well as the highly viscous buds, yellowish. *h.* 50ft. to 60ft. Europe, North Asia. The Black Poplar is of rapid growth and short duration; the wood is light, and is much used

Populus—*continued.*

for carving, charcoal-making, &c.; the bark is employed in tanning. (Sy. En. B. 1302.) For figure and dimensions of an enormous specimen of this tree, *see* G. C. n. s., xxi. 641.

P. n. pyramidalis (pyramidal).* Lombardy Poplar. Young leaves and branchlets glabrous. Habit pyramidal. SYNS. *P. dilatata, P. fastigiata.*

P. Simonii (Simon's). *l.* thick, sub-erect, 5in. to 6in. long, about 3in. broad, ovate-elliptic, equally attenuated at each end, dentate, crisped, intense green above, glaucous-white beneath. Branches elongated; bark reddish-brown. China, 1867. A tall tree.

P. tomentosa (tomentose). *l.* oval, 4in. to 5in. long, 2in. to 2½in. broad, usually cordate at base, very acutely toothed, intense green above, white-tomentose beneath. Young branchlets tomentose, adult ones glabrous; buds thick, conical, woolly-tomentose. China, 1867.

FIG. 254. BARREN BRANCHLET, AND ONE BEARING MALE CATKIN, OF POPULUS TREMULA.

P. Tremula (trembling).* Aspen. *fl.*, catkins 2in. to 3in. long, cylindric. March and April. *l.* 1in. to 4in. long; those of the shoots cordate, acute, entire, cottony beneath; those of the branches sub-orbicular-ovate, sinuate-serrate, with incurved teeth, glabrous or silky beneath; petioles very long, slender, glabrous; compressed branches spreading; buds pubescent, not viscid. *h.* 40ft. to 80ft. Arctic Europe (Britain), Africa, Asia. A well-known, erect tree, with white wood and grey bark. See Fig. 254. (Sy. En. B. 1307). The varieties *villosa* and *glabra* have respectively villous and more glabrous foliage than the type.

P. T. pendula (pendulous). A variety only differing from the type in its very pendulous branches. It makes a small, round-headed tree, and is best grafted on tall stems of the type.

P. tremuloides (Tremula-like). American Aspen. *l.* roundish-cordate, with a short, sharp point, and small, somewhat regular teeth, smooth on both sides, with downy margins; petioles long, slender, and laterally compressed. Adult branches glabrous; buds also glabrous, viscous. *h.* 20ft. to 50ft. North America. (E. T. S. M. 280, under name of *P. tremuliformis.*) SYN. *P. græca.*

PORANA (said to be the native name in the East Indies). SYNS. *Dinetus, Duperrya.* ORD. *Convolvulaceæ.* A genus comprising half-a-dozen species of stove or greenhouse, twining, slender, sometimes very high-climbing, annual herbs or shrubs, natives of the East Indies, the Malayan Archipelago, and Australia. Flowers frequently white, sometimes cymose or racemose at the apices of the branches, sometimes solitary in the axils; sepals subequal, stellato-patent; corolla campanulate or infundibuliform; limb plicate, of five broad, spreading lobes. Leaves sometimes cordate, many-nerved; sometimes ecordate, penniveined. The shrubby species are well adapted for training on rafters or pillars, in a stove, or in the warm part of a greenhouse. They thrive best in a compost of sandy loam and leaf mould, and are propagated by cuttings of stubby side shoots, which root readily in a compost similar to that just named. The annual species may be sown in heat, in early spring, and the seedlings either grown on in pots or planted out in the greenhouse or conservatory.

Porana—*continued.*

P. paniculata (panicled). *fl.* pure white, very small, tubularly campanulate; panicle large, much branched, leafy. August. *l.* cordate, acuminate, glabrous above and hoary beneath, 3in. long, 1½in. broad. Stem terete. East Indies, 1823. Plant shrubby, twining, clothed with hoary tomentum. SYN. *Dinetus paniculatus.*

P. racemosa (racemose).* *fl.* white, small; panicles loose-flowered, composed of racemes, leafy. July to November. *l.* cordate, acuminate, glabrous or downy, 3in. to 4in. long, with a wide recess at the base. Stem terete or angular. India, 1823. Annual. "This is the 'Snow-creeper' of the English, one of the most beautiful of Indian plants, the masses of dazzling white flowers resembling snow patches in the jungle" (C. B. Clarke). (S. B. F. G. 127.) SYN. *Dinetus racemosus.*

P. volubilis (twining). *fl.* white, small, numerous; panicles dense-flowered. July. *l.* cordate, acuminate, glabrous. Stem terete, glabrous, smooth or covered with white warts. East Indies, 1823. Plant shrubby.

PORANTHERA (from *poros*, a pore or opening, and *anthera*, an anther; the anthers open by pores). ORD. *Euphorbiaceæ.* A genus comprising five species of greenhouse, Australian herbs, annual or at length suffrutescent. Flowers white, monœcious, small, densely racemose, solitary in the axils of the bracts, pedicellate; females few, at the base of the capituliform racemes, which are solitary, or corymbose at the tips of the branches. Leaves alternate or rarely irregularly opposite, membranous, entire, small or narrow. *P. ericifolia*, the only species in cultivation, is a rather ornamental suffrutescent herb. It thrives in a peaty soil, and may be increased by seeds.

P. ericifolia (Heath-leaved). *fl.* numerous, the pedunculate racemes forming a dense, terminal, leafy corymb. July. *l.* crowded, sessile, linear, ¼in. to ½in. long, with revolute margins. Stem erect, 6in. to nearly 12in. high. 1824. (T. L. S. x. 22, p. 301.)

PORLIERIA (named after Andrew de Porlier, a Spanish patron of botany.) ORD. *Zygophylleæ.* A small genus (three species) of rigid, stove shrubs, with spreading, woody branches, natives of Texas, Mexico, the Peruvian Andes, Chili, and Parana. Flowers disposed in fasciculate, one-flowered peduncles; sepals four or five, rotundate, unequal, deciduous; petals four or five, unguiculate, imbricated. Leaves opposite, abruptly pinnate; leaflets almost opposite, entire, sensitive. The under-mentioned species (the only one introduced) thrives in a mixture of loam and peat. Propagation may be effected by ripened cuttings, inserted thinly in a pot of sand, and placed under a hand glass, in moderate heat.

P. hygrometrica (hygrometric). *fl.* green, white; calyx deeply four-parted; petals four, connivent. April. *l.* with seven or eight pairs of linear leaflets; these remain spread open during fair weather, but contract on the approach of rain. *h.* 2ft. Peru, 1820.

POROSTEMA. A synonym of **Nectandra** (which *see*).

PORPAX (of Lindley). Included under *Eria.*

PORPAX (of Salisbury). A synonym of *Aspidistra.*

PORPHYRA. A synonym of *Callicarpa.*

PORPHYREUS. Of a warm reddish-colour.

PORPHYROCOMA. Included under *Dianthera.*

PORRUM. Included under *Allium.*

PORTEA (named after Marius Porte, who first discovered the genus). Including *Ortgiesia.* ORD. *Bromeliaceæ.* A genus comprising three or four species of stove, American herbs, with short stems. Flowers beneath the upper bracts solitary, those under the lower

Portea—*continued.*

ones bi- or ternate; sepals ovate or ovate-lanceolate, scarcely imbricated; petals similar to those of *Billbergia*; peduncles terminal, with coloured scales; inflorescence in the typical species elongated. Leaves numerous, rosulate, elongated, rigid, spiny-serrate. The species require culture similar to **Billbergia** (which *see*).

P. kermesina (carmine).* *fl.* blue; spike erect, oblong, surrounded throughout by oblong-apiculate, rose-coloured bracts. *l.* tufted, spreading, ligulate, abruptly apiculate, channelled. *h.* 1½ft. Bahia, 1870. (R. G. 829; R. H. 1870, p. 239.) SYN. *Billbergia Brongniarti.*

P. Legrelliana (Legrell's). *fl.* spicate, with bright red sepals and bracts, and reddish-purple petals. *l.* lanceolate, recurved, 1ft. to 1¼ft. long, spiny. *h.* 6in. Brazil, 1875. SYNS. *Æchmea Legrelliana, Hohenbergia Legrelliana* (Ref. B. 285).

P. tillandsioides (Tillandsia-like). According to Bentham, this is the correct name of plant described in this work as *Æchmea Ortgiesii.*

PORTENSCHLAGIA. Included under *Elæodendron.*

PORTLANDIA (named in honour of a Duchess of Portland, who corresponded with J. J. Rousseau, and had some knowledge of English plants). ORD. *Rubiaceæ.* A genus comprising about eight species of handsome, very glabrous, shiny, stove shrubs and small trees, natives of the West Indies and Mexico. Flowers white or scarlet, large, often odorous, disposed on axillary, one to three-flowered, bracteate or ebracteate peduncles; calyx with an obovoid or campanulate tube, and a five-lobed, persistent limb; corolla large, sub-campanulate or clavate-infundibular, with a limb of five triangular, reduplicately valvate lobes. Leaves opposite, thickly coriaceous, petiolate, oblong or linear-oblong, with broad, intrapetiolar, deciduous stipules. Only three species have been introduced. These require a mixture of fibrous loam and leaf mould in equal parts, with the addition of a good quantity of sand; and plenty of heat and moisture are essential. Propagated by cuttings of rather firm shoots, inserted in sand, under a bell glass, and in a brisk, sweet bottom heat.

P. coccinea (scarlet). *fl.* scarlet, with yellow anthers, 3in. long, 2in. broad, axillary, pedicellate, solitary. *l.* ovate or elliptical-oblong, pointed, shining, 3in. long, 2in. broad. *h.* 2ft. to 3ft. Jamaica, 1812.

P. grandiflora (large-flowered). *fl.* white, reddish inside at the throat, 5in. long, 1½in. broad, very fragrant at night, axillary, solitary, pedicellate. June to August. *l.* elliptic or elliptic-oblong, pointed, shining. *h.* 10ft. to 14ft. West Indies, 1775. (B. M. 286.)

P. platantha (broad-flowered).* *fl.* pure white; tube 1in. long; the five-lobed limb nearly 4in. across. Summer. *l.* somewhat ovate or obovate, acute, deep shining green. *h.* 3ft. Native country unknown, 1849. (B. M. 4534.)

PORTUGAL LAUREL. *See* **Cerasus lusitanica.**

PORTUGAL QUINCE. *See* **Cydonia vulgaris lusitanica.**

PORTULACA (the old Latin name, used by Pliny, but by him spelt *Porcilaca*). Purslane. ORD. *Portulaceæ.* A genus comprising about sixteen species of stove, greenhouse, or hardy, annual or perennial, fleshy, diffuse or ascendent herbs, distributed over the whole world. Flowers purple, yellow, or pink; sepals two; petals four to six. Leaves alternate or irregularly opposite, flat or nearly cylindrical, often with tufts of bristles in their axils, and the upper ones forming an involucre around the flowers. The perennial species should be grown in a light position in a greenhouse, and potted in a mixture of loam, leaf mould, and coarse sand. The annual kinds may be raised from seeds, sown in boxes, and afterwards planted in a sunny border out of doors. All the species mentioned below, except the last, which is quite hardy, are best treated as half-hardy annuals.

P. foliosa (leafy). *fl.* yellow, about three; calyx hairy; petals retuse; involucre many-leaved. June. *l.* subulate. *h.* 6in. Guinea, 1822. (B. R. 793.)

Portulaca—*continued.*

P. Gilliesii (Gillies'). *fl.* red, purple, terminal, usually solitary. June and July. *l.* oblong, cylindrical, rather compressed, obtuse, dotted with axillary fascicles of hairs, erect, adpressed. Stems rather erect, branched at base. *h.* 6in. Mendoza, 1827. (B. M. 3064.)

FIG. 255. FLOWERING BRANCH OF PORTULACA GRANDIFLORA.

P. grandiflora (large-flowered).* Sun-plant. *fl.* yellow, purple, three or four together, terminal, crowded, surrounded by whorls of leaves and crowded hairs. June and July. *l.* scattered, cylindrical, acute, with pilose axils. *h.* 6in. Brazil, 1827. See Fig. 255. (B. M. 2885.)

P. g. Thellusonii (Thelluson's). *fl.* scarlet, large, terminal, sessile; petals two-lobed. Summer. *l.* sub-cylindrical, obtuse; floral ones sub-verticillate. Stem erect, thready in the axils. *h.* 1ft. 1839. SYN. *P. Thellusonii* (B. R. 1840, 31).

P. oleracea (culinary). Common Purslane. *fl.* yellow, solitary or clustered, stalkless above the last leaves on the branches. June and July. *l.* small, oblong, wedge-shaped, destitute of bristles in their axils. *h.* 6in. South Europe, 1582. The young shoots of this plant are sometimes put in salads, and the older ones used as a potherb, or for pickling. The species is generally cultivated in Holland, &c., for these purposes.

P. Thellusonii (Thelluson's). A synonym of *P. grandiflora Thellusonii.*

PORTULACARIA (so called from its resemblance to *Portulaca*). ORD. *Portulaceæ.* A monotypic genus, the species being a greenhouse, evergreen shrub, thriving in any dry, light soil. Propagated by young cuttings, taken off and dried for a few days, and then potted.

P. afra (African). Purslane-tree. *fl.* pink, small; peduncles opposite, denticulate, compressed; pedicels one-flowered. *l.* opposite, obovate, fleshy. *h.* 3ft. Africa, 1732.

PORTULACEÆ. A natural order of usually glabrous and more or less succulent, sometimes long-pilose, herbs, rarely small shrubs or under-shrubs, mostly American, some South African or Australian, a few Asiatic, North African, and European. Flowers regular, hermaphrodite, solitary at the tips of the branches, racemose, cymose, or paniculate, or the lower ones axillary or lateral; sepals fewer than the petals, commonly two, rarely five, free or adnate to the base of the ovary, closely imbricated, persistent or deciduous, herbaceous, scarious, or rigid; petals four or five, rarely many, hypogynous or rarely perigynous, connate, imbricated, entire; stamens inserted with the petals, free or in bundles, filaments filiform. Capsule membranous or crustaceous, rarely indehiscent. Leaves alternate or opposite, entire, often fleshy, sometimes stipulate. Several of the species are used as potherbs, and the herbage of *Portulaca oleracea* is eaten as a salad. *Claytonia tuberosa* has an edible root. Most of the plants comprised in this order are mucilaginous. *Portulaceæ* includes fifteen genera and about 125 species. Examples: *Calandrinia, Claytonia, Portulaca.*

POSOQUERIA (*Aymara posoqueri* is the name of *P. longiflora* in Guiana). SYNS. *Cyrtanthus* (of Schreber), *Kyrtanthus, Solena, Stannia.* ORD. *Rubiaceæ.* A genus consisting of about a dozen species of ornamental, very glabrous, stove shrubs, confined to tropical America. Flowers very sweet-scented, on ebracteate pedicels, disposed in terminal, many-flowered corymbs; calyx small, five-toothed; corolla white, pink, or scarlet, pendulous,

Posoqueria—*continued.*

with a terete tube sometimes more than 1ft. in length, a glabrous or villous, hardly dilated throat, and a five-parted limb; stamens five, a little exserted. Leaves opposite, on short petioles, coriaceous. For culture of the species described below, which are those best known in gardens, *see* **Gardenia.**

P. formosa (beautiful). *fl.* white, erect, very long, showy, sweetly scented; inflorescence terminal, cymose. July. *l.* opposite, oval, petiolate; stipules intrapetiolar, oblong-triangular, entire, at length deciduous. *h.* 15ft. to 20ft. Caraccas, 1815. (F. d. S. vi. 587; L. & P. F. G. i. 114.)

P. fragrantissima (very fragrant).* *fl.* white, very fragrant, with a slender, cylindrical tube, 6in. long, and reflexed, elliptic-oblong segments, disposed in sub-corymbose panicles at the ends of the branches. *l.* opposite, ovate-oblong, coriaceous, shining green, the principal veins yellow. Branches yellow Brazil, 1871. A very handsome plant. (I. H. ser. iii. 27.)

P. gracilis (slender). *fl.* white, four or five in a corymb; corolla with a curved tube and an irregular limb. September. *l.* oval-lanceolate; stipules oblong. *h.* 5ft. to 6ft. Guiana, 1825.

P. longiflora (long-flowered). *fl.* white, with the tube 6in. long, very much incurved, nutant at the apex, green at the base; hairs in the throat very long; corymbs from six to twelve-flowered. Summer. *l.* oblong, acuminated, acute at the base. *h.* 5ft. to 6ft. French Guiana, 1820.

FIG. 256. FLOWERING TWIG OF POSOQUERIA MULTIFLORA.

P. multiflora (many-flowered).* *fl.* white, fragrant, with a slender tube 4in. long, and a spreading, star-shaped limb 2½in. across; cymes terminal. *l.* broad, oval-oblong, coriaceous, velvety, villous beneath. Brazil, 1866. A magnificent plant. See Fig. 256. (I. H. 597.)

P. revoluta (revolute). *fl.* white, disposed in dense corymbs; corolla with a straight tube, a villous throat, and an irregular limb. April. *l.* elliptic-ovate, each ending in a short, cuspidate point, and having revolute margins. *h.* 5ft. to 6ft. Brazil, 1852.

P. versicolor (various-coloured). *fl.* various-coloured, changing from white to crimson through pink, long, pendulous, fragrant; segments of corolla not much longer than the stamens. August. *l.* oval-lanceolate, acuminate at both ends, glabrous. *h.* 6ft. Cuba, 1840. A handsome shrub. (B. R. 1841, 26.)

POSTERIOR. Applied to that part of an axillary flower which is placed next the axis of inflorescence.

POSTICOUS. On the posterior side; an adnate anther is said to be Posticous when it faces the petals.

POTAMOGETON (from *potamos*, a river, and *geiton*, a neighbour; alluding to the natural place of growth). Pond Weed. ORD. *Naidaceæ*. A genus comprising about fifty species (with many sub-species and varieties) of aquatic herbs, with creeping rhizomes, widely distributed. They are of no horticultural value. Twenty-one species are natives of Britain.

POTASH. A compound of oxygen with a metallic element, first separated, in the pure state, by Sir Humphrey Davy, in the beginning of this century, and named by him potassium, in allusion to its preparation from Potash. The latter was itself long regarded as an element,

Potash—*continued.*

because of the difficulty of analysing it, and of separating the oxygen in it from the potassium. This latter is an essential element in the chemical composition of plants; as may be inferred from two facts, viz.: (1) it is always present in the ash that remains when well-dried plants are burned; and (2) plants grown in soils or fluids of known composition, from which potassium is entirely withheld, remain stunted. Among the chief commercial sources of potassium are wood-ashes. These are washed, and carbonate of potassium and various other substances are separated from them in this operation; the water in which they are dissolved is then heated until it is mostly driven off in the form of steam, and the less soluble substances can no longer be kept in solution, but fall to the bottom of the vessel. The carbonate of potassium remains dissolved after the other compounds have separated out. The solution is poured off, and, on being heated till all the water is driven off, the carbonate remains in a somewhat impure state, known as pearl-ash. From this are prepared, by appropriate chemical processes, the element potassium, and its various compounds. The ashes of leaves, and, in fact, of all parts of plants, yield a considerable proportion of pearl-ash; indeed, it is more abundant in the green parts than in the wood. It is plentiful also in seeds. Phosphate and chloride of potassium are also found in the ashes of plants. The compounds of potassium, taken together, amount very frequently to one-half, or even more, of the total weight of the ashes. Potassium probably exists in plants combined with organic acids, formed in the plants during growth, *e.g.*, as potassic tartrate, potassic oxalate, &c.; but these compounds are broken up when the dried plants are burned; and they are replaced in the ashes by the compounds already mentioned. Plants obtain the potassium that they require from the soil, which is seldom, if ever, wholly devoid of the element. Its exact uses to plants are still somewhat uncertain, as the results of experiments do not entirely agree among themselves; but there is little doubt in regard to certain conclusions, which are founded alike on analyses of ash of plants and on experiments. It has been found that plants from which potassium is entirely withheld cease to form new food for themselves, although supplied with every other element required for their nutrition. The tissues and organs of the plants remain healthy for a time; but they do not increase in size. On supplying a solution of any compound of potassium to them, they begin to grow again, and they continue to do so if the supply is kept up. It has been ascertained, by experiment, that the compounds of potassium most useful to plants are the chloride and nitrate; the phosphates and sulphates being less effective in promoting increase in size.

In reference to the mode of action of potassium on plants, its presence seems necessary to permit of *starch* being formed in the green tissues, by means of the chlorophyll. But, in addition to starch being formed in the green parts, it must be transferred from the tissues, where it is formed, to those in which it is to be made use of, or to be stored; and this seems to require the presence of chloride or of nitrate of potassium in the tissues. When the sulphate alone is supplied, the leaves become gorged with starch grains, and fleshy, and look sickly. The same result follows, though less markedly, when the phosphate is used instead of the sulphate.

POTATO (*Solanum tuberosum*). The product of this valuable and well-known plant may safely be designated, as an article of food, one of the most important and essential of any obtained from the vegetable kingdom; indeed, it would be difficult to imagine how the present population could, for any length of time, be adequately fed and provided for without it. The species from which

Potato—*continued.*

the extremely numerous varieties have originated is a native of South America, chiefly Chili and Peru, where it is found under variable conditions regarding soil and climate. The date of its introduction into Britain is a matter which has undergone much discussion, but the plant is generally believed to have been brought from Virginia to Ireland, in 1585 or 1586, by Thomas Herriott, who accompanied Sir Walter Raleigh in several voyages. The Potatoes introduced by Herriott were planted near Cork; but the value of the tubers for food does not appear to have been recognised for a very long period afterwards. In some French works, Parmentier is given the credit of having introduced the Potato, but his *rôle* in the matter was simply that of rendering its cultivation more popular. There are six tuber-bearing Solanums out of the total of 700 which Bentham and Hooker estimate as distinct species. Mr. Baker's investigations, however, in Sutton's trial grounds, led him to believe that "all the numerous varieties in cultivation had originated from *S. tuberosum*. . . . . As far as climate is concerned, it cannot be doubted that *S. Maglia* (or the Darwin Potato, as we might suitably christen it in English) would be better fitted to succeed in England and Ireland than *S. tuberosum*, a plant of a comparatively dry climate. We have indisputable testimony that *S. Maglia* and *S. Commersoni* yield readily an abundant supply of eatable potatoes. What I would suggest is, that these should be brought into the economic arena, and thoroughly tested as regards their economic value, both as distinct types, and when hybridised with the innumerable *tuberosum* forms." The following are the most important contributions to the history, &c., of the Potato: "A Review of the Tuber-bearing Species of *Solanum*," by J. G. Baker, F.R.S., F.L.S. in Linnean Society's Journal, Botany, Vol. XX.; "On the Cultivated Potato," by Earl Cathcart, in the "Journal of the Royal Agricultural Society of England," Vol. XX., s. s., Part I.; and "Nouvelles Recherches sur le Type Sauvage de la Pomme de Terre," by Alph. de Candolle, in the "Archives des Sciences Physiques et Naturelles," Tome XV. (Geneva, 1886).

Potato culture seems to owe its extension more to the industry and attention paid to it by the poorer classes of Irish inhabitants for the provision of food in a time of sheer necessity, than to the recommendations of professional men respecting a new source of food supply. In Scotland, a state of great destitution and famine prevailed about the middle of the eighteenth century, and this had the effect of calling general attention to agricultural subjects, and causing Potato cultivation to receive considerable impetus. It progressed rapidly afterwards, as farmers began to include Potatoes amongst their field crops, and the plant's requirements soon became better known, and new varieties began to be raised. About the middle of the seventeenth century, measures were taken by the Royal Society to encourage the general cultivation of Potatoes throughout the kingdom for preventing famine; but still their enormous value for food was only imperfectly recognised until about a century later, when attention was devoted to the subject which has since become of such vast importance. Potato crops received a serious check when the destructive disease (a full reference to which will be found subjoined) appeared amongst them. This has never been altogether eradicated, but much has been done, by way of raising new varieties, and growing only such as are, to a certain extent, disease-proof. Much also depends on the seasons being favourable or unfavourable to the development of the disease, regarding the crop that may be annually expected; but, notwithstanding these drawbacks, the Potato must still be regarded as one of the most valuable commodities for food supply, more especially in the British dominions. Besides the

Potato—*continued.*

value of Potatoes for this purpose, the constituent parts of the tubers may be turned to account in other ways, as, for instance, in making Potato starch, which is applicable for use as true arrowroot, and is often called English arrowroot. A powerful spirit is produced by distillation, and wine by a process of fermentation. The Potato may be cooked as a vegetable in an endless variety of ways, in all of which it is usually much esteemed.

PROPAGATION. This is effected by seeds or by cuttings of the stem, but chiefly by the planting of tubers either whole or cut into pieces, each of which must contain at least one growing point, which is generally termed an eye. Potato seeds are only sown, as a rule, with a view to raising new varieties. This may be done in early spring, using pans of light soil, which should afterwards be placed in a little heat. The seedlings require pricking off before they become crowded; they may be transferred to a warm border, in the open, about the middle of May, and treated in a similar way to an ordinary crop. Only small tubers will be produced the first year; these, lifted in autumn, and preserved from frost, will bear others of larger growth the following season. Propagating from cuttings is not much practised, but is available for increasing the stock of any special variety. It consists in planting tubers in a little heat during early spring, and in inserting shoots as cuttings when they are about 3in. long. Tubers intended for planting are often termed "seed," to distinguish them from those required for other purposes. It is a matter of opinion whether they are injured by cutting into pieces, and also as to the suitability of large or small tubers for planting. Generally, it is not advisable to cut Kidney varieties, if they are of a medium size, and a sufficient quantity can be procured for planting. These have often a less number of eyes than Round ones, and, as the ends are pointed, the eyes are situated more closely together, and are not so readily divided. It has been found, from the mean product of two experiments, that cut tubers, used as sets, yielded a greater average than whole ones; but this is not to be accepted as a rule for general application. The advantage of large, or moderately large, sets over small ones, is obvious when we consider that the strength of the eyes and shoots which proceed therefrom is in proportion to the strength of the tuber. All the strongest eyes are situated on what may be called the top end of the tuber, and, when cutting is resorted to, it is a matter of importance to divide so that two, or at least one, of these prominent eyes are secured for each set. When the supply of Potatoes is very limited, both for culinary purposes and for planting, the tubers might be cut in half crossways, the upper portion being reserved as a set, and the other utilised for food. Potatoes intended for planting, particularly the early Kidney varieties, are considered much better for being exposed to the influence of light and sunshine in autumn until they become green throughout, and then stored in a dry shed through the winter. Early in the year, they may with advantage be set on end close together in shallow boxes, and allowed to start very gradually by keeping the boxes, in a light but cool place. The exclusion of frost is all that is requisite; artificial heat will have an injurious effect in encouraging the young shoots to grow fast and become weakened, instead of being short and vigorous. This preparation of sets for planting is requisite for frames, and for early crops outside, in order that the growth may be advanced beforehand, and their after-success so far insured: main crops inserted at a later and more favourable season seldom receive so much attention in advance.

It is generally admitted that an occasional change of sets is beneficial in cultivating Potatoes in any district. These should be procured from a different part of the

Potato—*continued.*

country, where the soil is also of a different description. The product of any given variety, for instance, may be of an indifferent quality in a heavy soil; transfer sets from this to another locality, where the conditions are altogether changed, and the results will, doubtless, be of a favourably marked description. In the changing of sets for planting, attention should therefore be directed to procuring them from a soil and neighbourhood where the surroundings are such as to effect a change as widely varied as may be practicable.

PLANTING AND GENERAL CULTIVATION. Potato planting is most extensively practised in spring, from February until towards the end of April, when the work should be completed for the year. Much depends on the locality and the state of the soil in different seasons; this latter would be found very variable at any given date, and the sets never start and grow evenly unless the soil is in a proper working condition at planting-time. From the beginning until the end of March, according as circumstances may permit, is the best period for inserting the main crops; those which are forwarded by being allowed to sprout first in a cool shed or room, must be reserved until towards the last, unless the situation in which they are placed is safely protected from frost. Autumn planting has been recommended, the tubers to be inserted deep in the soil; but this is now generally believed to be disadvantageous, and is seldom resorted to. Respecting the distance apart, both in rows and between the sets, much depends on the variety, the rich or poor nature of the soil, and the amount of exposure to light which the plants are afterwards likely to receive. For dwarf sorts, a distance of about 15in. between rows, and 9in. between sets, will be found ample; tall, strong-growing sorts, in good ground, will often cover all the space, if planted in rows from 2½ft. to 3ft. apart; but it is best not to allow more than about 8in. or 9in. between the sets, and these should be placed at a uniform depth of from 4in. to 6in. The sets are planted in various ways, but mostly in trenches cut with a spade, or in holes made with a dibber; in field culture, they are often placed in furrows made with a plough. Trenches are the best for garden crops; but the work by this system does not proceed so rapidly as it does when dibbers are used. A tolerably uniform depth may be secured by cutting a trench for each line as planting proceeds; the soil is left loose and open around the tubers, which is much preferable; and, when the whole is completed, all trampling on the newly-dug ground has been avoided. The use of a dibber affords a more expeditious mode of planting, and is extensively practised. When trenches are to be cut, a sufficient width of ground is prepared for each row; a line is then laid, and the ground cut out to the proper depth; this is filled in, after the sets are arranged in the bottom, and another space similarly prepared. By the other method of planting, holes are made next the line, with a dibber, at the proper distance apart. Another plan adopted with the dibber, is to use a strong one, about the length of a spade, and provided with a cross tread at about 6in. from the pointed end; this is chiefly practised in fields, or in large, open spaces, which have been prepared by ploughing or digging beforehand; a second person follows, and drops in the sets, and the holes may be filled in afterwards with a hoe. Amongst the chief objections to the use of dibbers, are those of treading the ground in making holes and planting, and the rendering of soil around the sets too compact by the necessary pressure; the sets are also invariably situated at unequal depths. Dibber-planting is less objectionable in light than in heavy or moist lands; but it may be noted that the last-named situations are not so preferable for the crop generally.

The subsequent culture consists chiefly in keeping the ground loose and free from weeds by lightly forking

Potato—*continued.*

or hoeing amongst the plants, and in earthing-up the soil in due course. The chief use of earthing-up is that of covering the tubers, which are, in reality, a sort of underground stems, and are formed on roots quite away from the set which was inserted. Where close planting is adopted, there is insufficient soil between rows to allow of a good ridge being drawn to each. Tubers also require covering to keep them from being exposed to light, which renders them unfit for food, although well adapted for planting. For this reason, therefore, the ridges should be made as wide on the top as possible, in order that the tubers may not protrude; by this arrangement, too, the top surface will be well situated for collecting rain water, and transmitting it to the roots, instead of allowing it to pass off. Earthing-up must be attended to so soon as the plants are sufficiently advanced; if delayed, the young tubers will have formed, and these will scarcely escape without injury.

Soil, Manure, &c. A good, friable loam, rather dry than otherwise, is that best suited for Potatoes. Wherever the land is naturally wet and heavy, or improperly drained, the quality of tubers is sure to be unfavourably affected. From rich garden ground, frequently and heavily manured, the quality is seldom so good as from a situation more exposed, such as an open field. In connection with many gardens, provision is made for growing the main crops on farm land, and limiting the garden to early supplies; where this is impracticable, late varieties should be relegated to the most open position at command, such as may often be selected inside a garden inclosure, yet outside the portion surrounded by walls. Dry and wet seasons have a material influence in connection with soils and the Potato crop; in heavy lands, the latter may be abundant and of good quality after a hot, dry summer; while in a wet one the plants will succumb very readily to the disease, and the tubers will be of a close, non-floury nature. On the other hand, a crop procured from soil comparatively light, will invariably be of good quality in any season, but will be less in quantity when the seasons are dry. Early varieties have, of necessity, to be grown in kitchen gardens, because of the requisite shelter being afforded, and borders where the soil is rather light and partially elevated afford the best position for meeting their requirements. A newly-turned-up soil is admirably adapted for a crop of Potatoes; much better, in fact, than when it has long been worked and highly manured. The tubers require a considerable quantity of moisture, but it must on no account be of a stagnant nature. In elevated land, for example, which has been devoted to grass, and then has been put under cultivation, the possibilities of stagnant water accumulating are remote, and the soil becomes naturally friable and open from aëration.

There are many manures which are in constant use for the Potato crop, and, unless the ground is fairly good in itself, one at least has to be used; but the produce is considered of better flavour, and less likely to suffer severely from the attacks of disease, where the application of manures is not necessarily of too frequent occurrence. The manure most commonly used is that obtained from a farmyard; it may be dug in equally all over the surface, or where the ground is very poor; the spreading of some in trenches, either beneath or above the sets, is the method more generally practised. One of the several manures which are mixed together in the farmyard is often the only one procurable by cultivators, especially cottagers, for their Potato crops. Of these, perhaps, pig-dung is most commonly met with; this should be well intermixed with the soil, or previously incorporated with a heap of refuse, &c., to be added as a compost for digging-in when planting. Partially-decayed leaf soil is an excellent ingredient for improving heavy land which has of necessity to be devoted to Potato culture, and so

Potato—*continued.*

are also burnt substances, such as wood and peat ashes, wood and peat charcoal, burnt clay, &c. Common salt is sometimes used beneficially as manure where the soil is unusually light and dry. Lime used occasionally for Potatoes has a marked effect, particularly on land already rich in decayed vegetable substances, the constituent parts of which require to be set free. Lime is also of use in killing slugs of various descriptions, which live in the earth, and frequently eat holes in, and partially destroy, the tubers. Guano, gypsum, bone-dust, nitrate of soda, and various other manures, have also been employed for the Potato, with more or less satisfactory results.

Digging and Storing the Crop. Before the destructive Potato disease made its appearance, the main crops could be allowed to ripen naturally, and their produce lifted for storing, in any suitable weather, and at any convenient opportunity, before the appearance of frost. Of late years, however, it has often been necessary to lift the successive crops, from the earliest onwards, so soon as the foliage indicates that the ripening process is approaching completion. After the appearance of disease in anything like an extensive form, the quicker lifting is commenced, the better, provided the produce is sufficiently matured to insure its keeping afterwards.

Exposure to light has a very injurious influence on Potatoes intended for food. It causes them to assume at first a yellowish tinge, and then a green colour, and materially impairs their flavour. The crop should, therefore, never be allowed to lie in the open air after being dug, except, perhaps, for an hour or two to dry; even this is unnecessary if the ground is in proper working order, and the weather fine; and from wherever the tubers are stored for the winter, or until required for use, light must be rigidly excluded. The most common plan of storing a stock of Potatoes is that of keeping them in pits; these, preferably, should never be made very large. A dry situation, or, at least, one where there is no possibility of water collecting, should be selected, and the soil dug out about 9in. deep, and 3ft. wide at the base. The Potatoes may then be piled up in a ridge as high as convenient, and covered with 9in. of soil, dug out from either side. The ridge, after being beaten flat with a spade, will be complete; it is then a good plan to thatch it with straw or dry fern, with a view to excluding frost and wet. It is advisable to make Potato pits with their ends pointing north and south. Thus arranged, a part of the contents may be taken out from the southern end, on a frosty day, without injury, when the sun shines, and the remainder made secure.

Culture in Pots, Frames, &c. An early supply of new Potatoes is always considered an essential in the kitchen garden, and various methods are adopted to secure it—first, from under glass; and next, from the most favoured positions outside which the garden affords. Pots 8in. in diameter are sufficiently large for one set each; they may be filled half full of soil at first, and top-dressed when the plants have grown. Potatoes grown under glass must not be subjected to much heat, nor must they be kept in a confined atmosphere. A light position in a frame, or on a shelf in a house where there is a little warmth, and plenty of air is admitted during favourable weather, is that best suited. Ordinary hotbeds in deep pits are well adapted for early Potato culture; to utilise all the space, the sets may be planted in rows 12in. or 15in. apart, and additional soil provided when earthing-up becomes requisite. Only dwarf, compact varieties should be grown under glass, and so soon as the weather allows, and after the plants are up, the sashes may be pulled off during the best part of the day, and put on again at other times. Potato plants are extremely tender. It is essential, in forwarding early crops, that protection from frost should always be secured. To succeed those grown under glass, other supplies should be brought on in warm, sheltered spots outside, choosing the same dwarf varieties for the first, and protecting them with fern, dry litter, or other substance, should unfavourable weather occur.

Potato—*continued.*

FUNGI. By far the most destructive of the Fungi parasitic on Potatoes is that which causes "Potato Rot," and which is described under the heading **Phytophthora infestans** (which *see*). It is unnecessary to repeat what has already been said, and therefore the reader is referred to the above-named article for an account of this Fungus. The tubers suffer greatly from its action on them, though the action is less speedy than it is on the green parts of the plants. But even where the Fungus has not itself severely affected a tuber, the latter is rendered a suitable food for various species of Fungi which grow on it, and cause its decay by either Dry Rot or Wet Rot. The Fungi that grow on Potatoes under these conditions have been carefully studied by the German botanists, Reinke and Berthold; and they, in 1879, published an account of their researches ("Zersetzung der Kartoffel durch Pilze"). Of the many Fungi that they found on rotting Potatoes, they attribute the chief share to a few—viz.: in Dry Rot, to *Fusisporium* (*Hypomyces*) *Solani*, *Nectria Solani*, *Verticillium cinnabarinum*, *Chætomium crispatum*, and *C. bostrychodes*; and, in Wet Rot, to *Bacteria* (*Bacterium navicula* and *Baccillus amylobacter*), although the Fungi of the Dry Rot were also present. They recommend exposure to air and heat, either of the sun or of artificial origin, to check the decay, by drying the substance, and to save as much of the starch as possible for conversion into dextrine, in which form it is now largely used. But other Fungi besides *Phytophthora infestans* attack growing Potatoes. One of the more dangerous of these is described in W. G. Smith's "Diseases of Field and Garden Crops" (pp. 15-29) under the name of *Peziza postuma*; but this Fungus is so like some others (*Peziza ciboroides*, *P. sclerotiorum*, &c.) that its specific rank is doubtful. Mr. Smith states that Potatoes in the West of Ireland were observed, in 1880, to suffer from a peculiar disease; but this was not fully traced to its cause in that year. It appeared at Stavanger, in Norway, in 1883, and also in the North of Scotland, where Mr. A. S. Wilson has grown the Fungus to maturity, *i.e.*, till the production of the *Peziza*. The diseased plants become covered with a dense coat of white mycelium; and, in a week or two from its first appearance, this kills the plants, withering up and drying the leaves. In the mycelium upon the stems there appear very many oval or rounded, hard masses, of all sizes up to ¼in. across. They become black externally, but remain white inside. These bodies are sclerotia, and consist of very compact masses of mycelium, and the black coat is made up of small, angular cells, with dark, thickened walls, closely united in growth. The sclerotia pass the winter

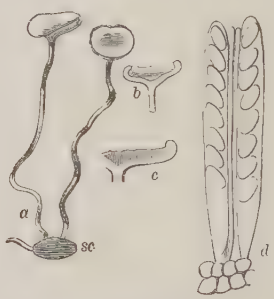


FIG. 257. PEZIZA POSTUMA—*a*, Small Specimen (natural size), with two Cups on slender stalks, which rise from an oval Sclerotium (*sc*); *b*, Cup, cut lengthwise; *c*, Section of Half of Cup, showing surface-layer of Asci; *d*, Two Asci, each with eight Spores, arising from small-celled Tissue of Cup (magnified about 250 times).

Potato—*continued.*

unchanged, but the following summer there grow, from those lying on or under the soil, from one to three *Peziza*, which have very long, slender, twisted stalks, each of which ends in a cup, which very soon becomes flat on top, and may reach ½in. across (see Fig. 257). The upper surface bears the very numerous asci standing side by side; each ascus incloses eight smooth, oval spores, which are ejected from it if the air is at all dry. If the spores fall on a suitable food-plant, they reproduce the Fungus.

All Potato haulms, and other rubbish, should be burned, instead of being left to infect the crop of next year. Deep ploughing or digging would bury the sclerotia too deep to allow the *Peziza* cups to reach the surface of the soil.

Potato Curl is a puzzling disease, since no evident cause could be detected by some observers, while Fungi have been discovered by others in the diseased plants. It was first observed in England in 1764, and soon afterwards was noticed in Rhenish-Germany and elsewhere. It has become less hurtful since 1820, or thereabouts. The young stems and leaves curve or curl up; the whole plant becomes sickly and stunted, and extremely brittle; the stems branch little, if at all; the leaves are small, and almost sessile; and the flowers and fruit often fall off prematurely, and all the green parts become mottled. Tubers are either not produced, or they are very small, and so watery as to be unfit for food. If used as seed potatoes, the disease usually, if not always, appears in the plants grown from them. Careful microscopic examination of the diseased plants has led to very different conclusions as to the cause, some observers (*e.g.*, Kühn) failing to detect any trace of Fungi, while others (*e.g.*, Hallier and Reinke) have found them in the interior of the diseased tissues. Hallier asserts, and Reinke agrees with him, that the disease is hereditary, or that diseased tubers produce diseased plants, and that these plants are not capable of forming tubers; that mycelium of Fungi is present in the inner tissues of the plants; and that infection with this mycelium will produce the same disease in previously healthy plants. Reinke and Berthold give the following account of the disease. The mycelium is present, they say, in the woody bundles of plants as soon as they begin to wither, and in badly-affected plants it may be traced throughout from the roots to tips of the leaf-stalks. It may also often be found in plants that show no outward sign of disease. If the plants are kept in a damp atmosphere, their whole surface becomes covered with a white coat of conidiophores, or spore-bearers, of Fungi, pushed out from the mycelium through the epidermis. These are, at first, colourless; and each bears two or three circles of short branches at the ends of the cells, which, in a single row, form the erect stem. There are from two to five branches in each circle, and one or more of them may bear one or two smaller branches. On the tip of each branchlet there grows a small, oval spore, which falls off on being wetted. They suggest for this Fungus the name of *Verticillium atro-album*. Mycelium was found in the tubers, even on plants that appeared moderately healthy.

In a second form of Potato Curl, the plants grow to full size, but then the edges of the leaves begin to curl backwards, and to become brown; and this extends to the whole of each leaf, and gradually back to the stems. Microscopic examination shows no Fungi in the leaves, or in the upper part of the stems; but underground the stems are marked with large, brown spots, and in the cortex of these spots the cells are traversed by mycelium, while the vessels show no trace of it. The roots also are brown and diseased, and the seed-tubers are often rotten. Cultivation of the Fungus showed it to be *V. atro-album*. At times, both forms of disease occur in the same plant. Tubers produced by plants

Potato—*continued.*

affected in either of the above ways are almost always diseased, and produce shoots that, from their first appearance, are evidently diseased. These shoots develop slowly, and remain small, stunted, and of an unhealthy colour. Dark spots appear on the leaves and on the leaf-stalks, and the leaves gradually wither from below upwards; and similar changes go on in the stems. The plants perish without being able to form new tubers. No Fungi have been detected in the leaves or stems of shoots produced by diseased tubers; but all the subterranean parts have the bark permeated by mycelium, though there is none visible in the woody bundles. The diseased tubers show an abundant mycelium in the corky layers of the skin. Cultivation of the mycelium, in each case, has yielded *V. atro-album*. Inoculation from diseased plants rendered previously healthy plants diseased; and healthy tubers planted in soil impregnated with conidia of *V. atro-album* produced diseased shoots. Reinke and Berthold suggest that *V. atro-album* may be an imperfectly-developed condition of some Pyrenomycetous Fungus of the genus *Nectria*, or closely allied to it, and oppose the view advocated by Hallier, that the cause of Potato Curl is *Pleospora polytricha*; nor do they think the disease is caused by any species closely allied to the genus *Pleospora*. Schenck, in a series of observations and cultivation of the diseased plants, obtained from some of them Fungi which were much like one form of conidia attributed to *Pleospora herbarum*, and which he called *Sporidesmium exitiosum* var. *Solani*. It is evident that there is need of further observations, since there may be more than one cause of this disease, and true parasites may be confounded with Fungi that grow only on tissues already dead. No cure is known; hence, prevention is the aim to be kept in view. Diseased plants should be pulled up and removed as soon as detected; and all the Potato-stalks should be collected into heaps and burned. Care should also be taken to prevent unsound tubers from being made use of as seed. In short, the means employed to limit the spread of Potato Rot, and of *Peziza postuma*, are equally applicable against Potato Curl.

In common with other herbaceous plants, the Potato affords, in its dead stems and leaves, an abundant food supply to many kinds of Micro-fungi; but, as none of these are known to be injurious to the plants during life, they do not require even to be enumerated here.

Potato tubers are rendered unsightly, at times, by the skin being more or less covered with brown patches or scabs. These may be due to various causes. In some cases, a microscopic examination shows that the scab is due to the growth of a Fungus, named *Tubercinia scabies*, the spores of which are formed of small cells, grouped into a globe around an air space. Each spore has a slender stalk at one side. There is often no trace of this Fungus at harvest-time; but, during the winter, it develops, and the spores form a layer beneath the skin, often extending over a great part of the tuber. After a time, the spores are set free by the bursting of the skin. In other forms of scale, the cells are filled with mycelium of Fungi, and the formation of the scab is probably due to the irritation caused by its presence in the tissues. In others, there is no trace of the action of Fungi; and it has been conjectured that the cracks, followed by scabbing, are due to contact with irritant or corrosive substances in the soil, and that the scabs are due to efforts at healing the injury; but new cracks form in them, and so the mischief goes on. The raw surfaces of the cracks render the tubers more liable to injury from Fungi, insects, frost, and other external causes. Scabbed Potatoes are diminished in value because of their unsightliness; but they do not seem unfitted for food when the skin is removed. They should not, however, be used as seed. When the cause

Potato—*continued.*

is in the soil, it should be either removed or counteracted. Potatoes should not be grown in soil known to give rise to scabbing.

INSECT PESTS. There are no insects, in the British Islands, absolutely confined to the Potato as their food; but several occasionally devour this, as well as other cultivated plants. To begin with those that eat the roots and tubers. Amongst the worst are the larvæ of several

FIG. 258. SKIPJACK, OR CLICK BEETLE—*a*, Line showing the natural length.

kinds of Skipjack Beetles (see Figs. 258 and 259), which bore holes in the tubers, to which they are very partial (*see* **Wireworms**). The larvæ of Cockchafers (*Melolontha vulgaris*) and Mole Crickets (*Gryllotalpa vulgaris*) also gnaw them, and the roots at times (*see* **Cockchafer** and **Mole Cricket**). The larvæ of certain *Noctuæ*, or Night Moths (*see* **Noctua** and **Turnip Moth**), are sometimes very destructive to the tubers, but do comparatively little harm to the other subterranean organs, since, as a rule, they do not feed at the season of growth of Potato-plants. Among the most harmful are the Heart-and-Dart Moth (*Agrotis exclamationis*), the Turnip Moth (*A. segetum*), and nearly-allied species. The larvæ of Crane Flies (*Tipula oleracea* and allies), commonly known as the Grub, or as Leather Jackets, because of the toughness of their skins (*see* **Crane Fly**), frequently injure the roots of growing Potatoes, and may also feed on the young tubers, though most destructive to grasses. Many kinds of small *Diptera* live, as larvæ, in decaying Potato tubers, and Curtis, in his "Farm Insects," has recorded ten species reared by himself from this food; but there is no evidence to show that they injure healthy tubers. Millipedes, including *Polydesmus complanatus*, and one or two species of *Julus* (*see* **Millipedes** and **Myriapoda**), are often found feeding in the tubers, but they hardly seem to bore into them if quite healthy, and, in general, appear to take advantage of holes scooped out by the larvæ already mentioned, or to bore into tubers which are softened by disease. Centipedes also (*see* **Myriapoda**) are often found in holes in the tubers, but they are all

FIG. 259. WIREWORM, OR LARVA OF SKIPJACK BEETLE.

carnivorous, and probably assist in reducing the number of destructive larvæ. Last of the animals that destroy the tubers, must be mentioned the various kinds of Slugs, which eat large holes in them, and continue to feed in these till, occasionally, there is little left of the smaller tubers (*see* **Slugs**). Slugs do not seem to do much harm to the green parts of Potato-plants.

The green stems and the leaves are not, as a rule, liable to severe insect attacks with us, though in North

Potato—*continued.*

America they suffer much damage from this cause. The more injurious of these American insects will be here briefly referred to after mention has been made of such as have been observed in Britain.

Curtis records finding a beetle (*Macrocnema exoleta*), allied to the Turnip Flea, feeding on the leaves of Potatoes, and still more abundantly on the Bitter-sweet *Solanum Dulcamara*). The beetle has the head black, the thorax deep ochreous, the elytra pale ochreous, except a pitchy line down the suture, and the limbs pale. It is from $\frac{1}{12}$in. to $\frac{1}{8}$in. long. These pests can scarcely be ranked as a serious danger to the Potato crop, but, should they become dangerous to it, they may be reduced in numbers by the same methods as are employed against the **Turnip Flea** (which *see*).

Of moths, few live, in the larval state, on Potato leaves; but one species is almost restricted to this plant—the Death's Head Hawk Moth (*Acherontia Atropos*). This moth (see Fig. 260) is one of the largest and handsomest of our native species. The appearance, form, and markings, are shown in the woodcut; but the spread of wings may be 5in. The fore wings

FIG. 260. DEATH'S HEAD HAWK MOTH.

are a fine brown, with darker and paler markings, and a conspicuous yellow dot in the centre. The hind wings are orange-yellow, with two dark bands. The body is yellow and brown, with six black cross bands on the abdomen, and a row of six bluish spots down the middle of the back. The thorax bears, between the fore wings, a large mark, like a skull, or "Death's head," whence the popular name. Because of this mark, also, the insect is much dreaded, in various parts of Europe, by superstitious rustics and others, as ill-omened; and this impression is deepened by the power (very rare among moths) of emitting a sharp squeak when handled. The larva and pupa can also emit peculiar sounds. The larva feeds now chiefly on Potatoes; though it has also been found on the Jasmine, the Deadly Nightshade (*Atropa Belladonna*), and the Tea-tree (*Lycium barbarum*). It reaches a very large size, tapering a little towards the head, but ending abruptly behind, where it bears a small horn, very rough, yellowish, and bent downwards, but turned up at the tip. The creature is smooth, and is usually pale yellow on the back, and green near the head and along the lower part of the sides. There are seven oblique, violet or

Potato—*continued.*

blue stripes, on each side, each pair of which meet on the back. The body is sprinkled with minute, black dots. A variety sometimes occurs of a brownish-olive, with the stripes darker. The larvæ feed only by night, hiding in the soil by day. Their large size renders them somewhat destructive; though they are never so common as to endanger the crop. When full-fed, they crawl under ground, and there each forms an earthen cell. In this it turns into a large pupa of a red-brown colour. Some of the moths may emerge in the late autumn, and hybernate; but most do not appear till spring. Should it be necessary to reduce the numbers of larvæ, they must be sought for at night, by lantern light, on the ravaged plants; their large size renders them conspicuous. The pupæ are frequently turned up in the fields during Potato harvest.

Several species of *Hemiptera*, or Plant-bugs (*see* **Insects**), have been recorded by Curtis, in "Farm Insects," as living on Potatoes, boring into the tissues with their long, sharp beaks; and, by sucking the sap from the green organs where abundant, they greatly weaken the plants. Several of them belong to the group *Hemiptera Heteroptera*, in which the fore wings have the basal half leathery, and the other half membranous. Curtis mentions several, as found by himself, feeding on the Potato crop, all of them belonging to the genus *Lygus*. These insects are green or ochreous, passing into rosy, and are about ¼in. long. He also describes two species of Frog Hoppers, which belong to the group of *Homoptera*, which have the wings of uniform texture (*see* **Frog Hopper**). These are also about ¼in. long. One of these (*Eupteryx picta*) is yellow with black spots, and brown clouded markings on the front wings. The other he names *E. Solani*, as a new species (G. C. vi. 388), and describes it as lively green, with the tips of the fore wings rusty-brown. The name is noticed in the latest list of British *Homoptera* as a synonym of *Chlorita viridula*, Fall.

Remedies. These *Hemiptera* undoubtedly do harm when very numerous. Probably, the most effective means of reducing their numbers would be to sweep the rows of Potatoes, every now and then, with a large insect net, removing and destroying the insects caught. Applications to the plants are scarcely required, though Paris Green, applied as recommended for the **Potato Beetle,** would be effective.

Aphides do so little harm that it is scarcely necessary to refer to them. The only species noted by Buckton, in "British Aphides," as feeding on Potatoes, is *A. urticaria*. Two or three others have also been recorded from the Continent.

The insects most hurtful to Potato-plants in the United States of America, and in Canada, are beetles, most of them belonging to the group of Blister Beetles, of the genus *Lytta*. Five species of this genus have been observed to feed on the leaves and stems, but only as beetles. There seems little reason to fear injury from them on this side of the Atlantic, since their habits do not favour the chances of their being accidentally imported. The same holds good of the Three-lined Leaf Beetle (*Lema trilineata*), one of the *Chrysomelidæ*, which lives, as larva and as beetle, on Potatoes; the larva shelters itself under a coating of its excrements. The famous Colorado Beetle (*Doryphora decemlineata*) requires a longer notice, and this will be found under the heading **Potato Beetle.** Still another American beetle that injures Potato crops is the Potato-stalk Weevil (*Baridius trinotatus*), which does harm only while in the larval state. The larva bores into the stems near the base, and eats downwards towards the root, killing the plants. It is white, and legless. The beetle is a dark, long-snouted Weevil, about ⅛in. long. It does not seem likely to be transported over seas to us; nor does there

Potato—*continued.*

seem reason to fear the introduction of the other American insects that injure Potatoes.

SORTS. Varieties of Potatoes are exceedingly numerous, and new additions are annually made. It is requisite to have a selection of early, second early, and late ones, for maintaining the supply throughout the year. Some few sorts are grown in immense quantities because of their generally good flavour and cropping qualities under varied circumstances; others—a far larger proportion—are grown for private consumption, on a more limited scale, in gardens, and also by persons who exhibit collections at shows. Soil and locality have an important bearing on the quality and productiveness of different varieties of Potatoes, and the effect on each can only be properly learned by experience. A few good sorts known to succeed should always be depended upon, and new ones tried at first in small quantities, until their respective merits are ascertained. The extent to which any sort will withstand disease, especially in an unfavourable season, is now a material consideration when judging of its suitability for extended cultivation. Subjoined is a limited selection of sorts which are amongst those most approved.

Kidney-Shaped. ASHLEAF, MYATT'S PROLIFIC, a well-known, prolific sort, which follows the old variety in season. ASHLEAF, OLD, a very old variety, but still one of the best for early supplies. ASHLEAF, VEITCH'S IMPROVED EARLY, a very heavy cropper, of handsome appearance, excellent quality, fine flavour, and a first-rate forcer; quite distinct. BEAUTY OF HEBRON, a heavy cropper, and early; tubers very handsome, smooth in texture, and slightly tinged with pink around the eye; fine for exhibition. COSMOPOLITAN, an excellent early white variety, of fine form, very productive, and of superior table quality. COVENT GARDEN PERFECTION, a second early white variety, of medium size and very handsome shape; a heavy cropper, and remarkably free from disease; fine for exhibition. EARLY DWARF-TOP, very small top, early, and fine for forcing. EARLY ROSE, a first early, American variety, of great productiveness. INTERNATIONAL KIDNEY, very handsome in shape; one of the finest exhibition Kidneys LAPSTONE, a well-known and good sort, of fine shape, and excellent quality. MAGNUM BONUM, a late, heavy cropper, of robust growth, and very free from disease. MISS FOWLER, a handsome late, white variety, seedling from WOODSTOCK KIDNEY, but much more prolific, and a thorough disease-resister; top growth strong and robust; a very heavy cropper; tubers of moderate size, very even, and of finest table quality. PRINCE ARTHUR, one of the best main crop Potatoes; a heavy cropper and excellent keeper; the flesh is white, and, when boiled, very floury, and of first-class quality. WELFORD PARK KIDNEY, tubers large, of first-rate table quality, very smooth, with clear, white skin; one of the finest varieties for exhibition or table use. WOODSTOCK KIDNEY, a very handsome variety, of beautiful shape, with very level eyes and rather rough skin; a good cropper, white and mealy when cooked; fine for exhibition. WORMLEIGHTON SEEDLING, excellent for table use; a great cropper and good keeper. YORKSHIRE HERO, a variety of unusual excellence; one of the finest of the LAPSTONE section; smooth, handsome tubers of highest quality, and a long keeper.

Round. BEAUTY OF KENT, a very handsome, second early variety; the tubers are flattish-oval in shape, and of a rich rosy-pink colour, and keep good till March; a fine variety for exhibition. BEDFONT PROLIFIC, a second early sort, very heavy cropper, of the finest quality, and a handsome exhibition variety. BLANCHARD, a fine, large variety, of handsome shape, with clear, white skin, beautifully streaked with purple; very desirable for exhibition purposes. DALMAHOY, a second early variety, of excellent quality; one of the best for general use. DUNBAR REGENT, a well-known, good late sort, very productive. EARLY COLDSTREAM, a remarkably early and prolific variety, of beautiful shape, and very white and floury; fine for forcing. EARLY REGENT, early, productive, and of good flavour. GRAMPIAN, a handsome and distinct, early variety; skin pinkish-white, flaked with rich rosy-pink round the eyes; an abundant cropper. M.P., a really excellent white variety, with rather deep eyes; seedling from PATERSON'S VICTORIA, of dwarf, stout growth, the crop remarkable for quantity and evenness, of most excellent size, and the quality all that can be desired; it is a second early, but requires time to ripen for the table. PATERSON'S VICTORIA, an excellent sort for general use, large, and very productive. PORTER'S EXCELSIOR, a remarkably handsome variety, superb for exhibition. RADSTOCK BEAUTY, tubers singularly handsome, and of fine quality; a robust grower and heavy cropper. READING HERO, a heavy cropper, of excellent quality, and very free from disease. READING RUSSET, a heavy cropping, second early variety, of good quality. RED EMPEROR, OR MAIN CROP, skin clear light red, very handsome tubers; fine for exhibition. SCHOOLMASTER, a very superior main crop variety; tubers large, round, of regular

Potato—*continued.*

form, with small eyes; flesh white and floury when cooked; an abundant cropper, very handsome, fine for exhibition, and excellent for general use. SCOTCH CHAMPION, a good main crop variety, a heavy cropper, and very free from disease. VICAR OF LALEHAM, a very fine and distinct variety, seedling from VICTORIA; the tubers are purple, round, and of very handsome shape, with beautiful white flesh, of first-rate table quality, and fine for exhibition purposes.

POTATO BEETLE (*Doryphora decemlineata*). This insect, also often called the Colorado Beetle, though not yet a resident in the British Islands, is among the best known of insects, by name, at least, to most persons in the United Kingdom, thanks to the scare that arose with regard to it a few years ago. It was first observed in the Rocky Mountains of America, in the Colorado region, feeding on a wild species of *Solanum*, the genus to which the Potato belongs. When Potatoes were planted by settlers in the beetle's native home, it attacked the new food-plant, throve on it only too well, and commenced to spread rapidly eastward; and in 1876 it reached the Atlantic coast. It is now common along the Eastern States, and in Canada, and it is not impossible that it will be conveyed to, and may be able to establish itself in, our own islands. It has proved able to withstand heat and cold, dry and moist climates; and would pro-

FIG. 261. POTATO BEETLE (*Doryphora decemlineata*), natural size.

bably find our climate suit it. In its passage eastward in America, it committed great havoc in the Potato-fields, and excited fears in the minds of many, lest it should continue, year by year, to inflict severe injury to the Potato crop, and lest it might effect a footing in Britain, as appeared very probable. To guard against this latter risk, the Privy Council of Great Britain and Ireland passed an Order, which was published in the "London Gazette" of August 17th, 1877, to the effect that "If the owner of, or any person having the charge

FIG. 262. POTATO BEETLE (*Doryphora decemlineata*), enlarged. The left wing-case has been removed to show the wing.

of, any crop of Potatoes, or any vegetable, or substance, finds, or knows to be found, thereon the Colorado Beetle, in any stage of existence, he shall, with all practicable speed, give notice of the same to a Constable of the Police establishment of the locality; . . . . . and it is further provided that it shall not be lawful for any person to sell, keep, or distribute living specimens of the Colorado Beetle in any stage; and any person failing to do anything he is by this Order required to do, is, for each offence, liable to a penalty not exceeding ten pounds."

An idea of the general form, size, are markings of the

Potato Beetle—*continued.*

beetle may be obtained from Figs. 261 and 262, and of the larva from Fig. 263. The colours of the beetle are as follows: It is usually straw-yellow above, though, at times, the head and thorax are tawny-yellow, with black spots on them, as shown. The wing-cases each bear five equidistant, black bands, the second and third of which, counting from the middle, frequently meet behind. The legs are tawny-yellow, with black knees and tarsi, and (in, at least, the last pair) black thighs; the antennæ are yellow in their basal part, black in the rest of their

FIG. 263. LARVA OF POTATO BEETLE (*Doryphora decemlineata*), natural size.

length. The larva (see Fig. 263) is pale yellow, or, rather, dusky-yellow, or freckled with minute black dots on the back; and there are *two* rows of larger black dots along each side; the legs are black. The females place their eggs in small clusters on the lower surface of the

FIG. 264. EGGS OF POTATO BEETLE ON A LEAF, natural size.

Potato leaves (see Fig. 264). The eggs are oval, smooth, bright yellow, and glossy. In five or six days, the larvæ appear, and in from two to three weeks they are full-fed, and creep under ground, to become pupæ. In about a fortnight, the beetles emerge, and the females proceed to egg-laying. In America, three broods are produced each year, the third brood hybernating under ground, or in any suitable retreat. Both larvæ and beetles feed on the leaves of Potatoes, and soon leave nothing but the mere ribs, utterly destroying the crop.

In June, 1877, the insect was found at Mühlheim, on the Rhine, and in three places at Schildau, in Prussian Saxony; but it was stamped out by the energetic action of the Prussian Government. Occasional living examples have been found in British seaports, but they have never appeared in this country on the Potato crops. In America, and in Germany, it has been observed that, when they have exhausted the Potato-plants, they resort to low weeds, *e.g.*, Goosefoot, Knotgrass, Hedge Mustard, and even to Cabbage.

Remedies. In America, the use of Paris Green, or Scheele's Green (hydrocupric arsenite), sold at about 6d. per lb., is found effectual in saving the crop of Potatoes. It may be dusted on the plants, but it is better to mix it with water, in the strength of a tablespoonful to a bucket of water, and to sprinkle them with this. Caution must be used in handling this substance, as it is a dangerous poison. Hand-picking would probably be sufficient to get rid of the insects on their first appearance in a new

Potato Beetle—*continued.*

locality, at a distance from other habitats, as must be the case in their appearance anywhere in Europe.

For other Beetles destructive to Potatoes, *see* remarks on INSECTS under **Potato.**

POTATO ONION. A variety of Onion, cultivated in much the same way as Shallots. Single bulbs may be planted in January, or as early in spring as weather permits, in rows about 12in. apart, a distance of 6in. being allowed in the rows. The produce is useful for an early supply. Increased only by tubers.

POTATO, SPANISH or **SWEET.** A common name applied to **Batatas edulis** (which *see*).

POTENTILLA (a kind of diminutive from *potens*, powerful; alluding to the reputed medicinal power, of which these plants really possess very little, being merely mild astringents, like the rest of the tribe). Cinquefoil. Including *Comarum*, *Horkelia*, *Sibbaldia*, and *Tormentilla*. ORD. *Rosaceæ*. A large genus of glabrous, pilose, or silky-tomentose, mostly hardy sub-shrubs or herbs, rarely annuals. According to the authors of the "Genera Plantarum," the species number about 120, although upwards of 220 have been accorded specific rank by various authors. They are natives of the temperate and frigid regions of the Northern hemisphere, rarely occurring in the tropics; only two species have been found in the Southern hemisphere. Flowers white or yellow, very rarely red or purple, often disposed in corymbose cymes, rarely axillary and solitary; calyx persistent, with a concave, hemispherical, or urceolate tube, and five (rarely four) erect or spreading, triangular-ovate, valvate lobes; petals five (rarely four), obovate, orbiculate, or linear-spathulate; stamens usually numerous. Leaves alternate, or the floral ones opposite, digitately three to seven-foliolate or impari-pinnate; leaflets solitary, or bi- or ternate, often lobed or divided; stipules adnate to the base of the petioles. Several species of this genus are very desirable subjects for rockwork, bare banks, and similar situations; they thrive in almost any moderately good garden soil, but a sandy one is preferable. Potentillas may be readily propagated by division, or by seeds. Some of the hybrid forms are of far more importance to horticulturists than the typical species. The undermentioned are hardy herbaceous perennials, except where otherwise specified.

P. alba (white). *fl.* white, with a dark orange ring at the base, nearly 1in. across; petals obcordate, longer than the calyx; pedicels axillary and terminal. February to August. *l.*, lower ones quinate, upper ones ternate. Stems procumbent, weak. European Alps, &c.

P. alpestris (mountain). *fl.* bright yellow, about 1in. across, with cordate petals and acute sepals; pedicels axillary and terminal, long. July. *l.*, radical ones of five, rarely of seven, wedge-shaped, rather hairy leaflets, deeply cut in the upper half. Stems ascending. *h.* 6in. to 12in. Europe, &c. (Britain). (Sy. En. B. 429.)

P. ambigua (doubtful).* *fl.* rich yellow, about 1in. across, and just overtopping the dense carpet of foliage. June. *l.* green, forming a dwarf, dense mass. *h.* 6in. Himalaya, 1851. A creeping plant, of free growth. (B. M. 4613.)

P. arguta (sharply-serrated). *fl.* pale yellow, in a crowded, dichotomous panicle; petals obovate, entire, longer than the calyx. June and July. *l.* pinnate; leaflets roundish-ovate, oblique at base, doubly and deeply toothed. Stem erect, pubescent. *h.* 1ft. to 3ft. North America, 1826. (B. R. 1379.)

P. argyrophylla (silvery-leaved).* *fl.* yellow, ¾in. to 1¼in. in diameter; petals obcordate-cuneate; calyx silky. Summer. *l.*, leaflets sessile or slightly-stalked, green, finely silky above, white beneath; teeth acute. *h.* 1½ft. to 3ft. Himalaya. SYN. *P. insignis* (B. R. 1841, 37).

P. a. atrosanguinea (dark blood-coloured). *fl.* of a beautiful dark crimson. Himalaya, 1822. SYN. *P. atrosanguinea* (L. B. C. 786; B. M. 2689).

Potentilla—*continued.*

P. atrosanguinea (dark red). A synonym of *P. argyrophylla atrosanguinea.*

P. Clusiana (Clusins'). *fl.* in terminal corymbs; corolla white, large; petals roundish, hardly longer than the calyx. June to August. *l.*, radical ones quinate, cauline ones ternate; leaflets oval-cuneiform, pubescent, tridentate at apex, with connivent teeth. *h.* 6in. Eastern Europe, &c., 1806. (B. M. 1327; J. F. A. 116.)

P. Comarum (Comarum). Marsh Cinquefoil or Potentil. This is the correct name of the plant described in this work as *Comarum palustre.*

P. congesta (crowded).* *fl.* crowded, terminal; corolla white; petals longer than the calyx; outer calyx segments quite entire. August. *l.*, radical ones pinnate; leaflets cuneate-oblong, cut at the apex. *h.* 1ft. to 2ft. California, 1826. (B. M. 2880, under name of *Horkelia congesta.*)

P. formosa (beautiful). A synonym of *P. nepalensis.*

FIG. 265. POTENTILLA FRUTICOSA, showing Flowering Branch, detached Flower, with Petals removed, and Carpel.

P. fruticosa (shrubby).* *fl.* yellow, sub-corymbose, numerous, small, with obovate-roundish petals, longer than the calyx. Summer. *l.* pinnate; leaflets oblong-lanceolate, quite entire, hairy. *h.* 2ft. to 4ft. Northern hemisphere (Britain). Shrub. See Fig. 265. (Sy. En. B. 436.)

P. gracilis (slender). *fl.* golden-yellow; petals obcordate, longer than the silky calyx. July. *l.* quinate, lower ones on long petioles, upper ones sessile; leaflets lanceolate, deeply and pinnatifidly serrated, white-tomentose beneath. Stem hairy, corymbosely panicled at apex. *h.* 1ft. to 2ft. North America, 1826. (B. M. 2984.)

P. grandiflora (large-flowered). *fl.* yellow, large; petals obcordate, twice the length of the calyx; receptacle pilose. June and July. *l.* ternate; leaflets obovate, cuneate at base, deeply serrated, pilose. South Europe, 1640. Plant ascending. (B. M. 75.)

P. Hopwoodiana (Hopwood's).* *fl.*, petals beautifully variegated, marked with a spot of deep rose-colour at the base, and from it to the centre of a pale straw-colour, edged with bright rose-colour. June and July. *l.*, lower ones with five or six leaflets, upper ones ternate; leaflets oblong-cuneiform, coarsely toothed, hairy on both surfaces. *h.* 1½ft. A hybrid. (B. R. 1337; S. B. F. G. ser. ii. 61.)

P. insignis (remarkable). A synonym of *P. argyrophylla.*

P. laciniosa (jagged-leaved). *fl.* yellow, disposed in corymbose panicles; petals obcordate, much longer than the calyx. June and July. *l.* with five to seven oblong, laciniately-pinnatifid, pilose leaflets. Stem erect, reddish. *h.* 1ft. to 1½ft. Hungary, 1816. A sub-species of *P. recta.* (B. R. 1478.)

P. lupinoides (Lupine-like). A synonym of *P. nivalis.*

Potentilla—*continued.*

P. minima (smallest). *fl.* yellow; calyx segments shorter than the corolla. May and June. *l.* ternate, smoothish above, but pilose beneath; leaflets obovate, short, crenated, and rather retuse. *h.* 3in. Alps, 1818. (L. B. C. 480.)

P. missourica (Missouri). A synonym of *P. pennsylvanica.*

P. nepalensis (Nepaul). This species is very like *P. argyrophylla atrosanguinea*, but has quinate, radical leaves. Himalaya. SYN. *P. formosa* (S. B. F. G. 136).

P. nitida (shining).* *fl.* of a delicate rose, the green sepals showing between the petals, the petals nearly oval in outline, notched at the apex, longer than the calyx; solitary. Summer. *l.* ternate; leaflets obovate or wedge-shaped, toothed at the apex, clothed on both sides with shining, silvery, silky down. Stems ascending. South Europe, 1815. (Gn., June, 1884; J. F. A. 25; R. G. 858.)

P. nivalis (snowy). *fl.* three to six, terminal; corolla white; petals obcordate, shorter than the calyx. July. *l.* with five to seven obovate, roundish, obtuse leaflets, which are connivently serrated at the apex, and densely clothed with silky hairs. Stem erect, pilose. *h.* 3in. to 6in. Pyrenees, 1739. SYN. *P. lupinoides* (L. B. C. 654).

P. nivea (snowy-leaved). *fl.* yellow; petals broad, obcordate, a little longer than the calyx. June to August. *l.* ternate; leaflets obovate-cuneiform, with flat, deeply serrated margins, rather hairy above, but clothed with white tomentum beneath. Europe, &c., 1815. Plant ascending. (L. B. C. 460.)

P. n. macrophylla (large-leaved). A variety with larger flowers and leaflets, and elongated petioles. (B. M. 2982.)

P. pennsylvanica (Pennsylvanian). *fl.* yellow, corymbose; petals emarginate, longer than the woolly calyx. June to August. *l.* pinnate, with usually three pairs of leaflets, hoary and silky above, white-downy beneath; leaflets oblong, pinnatifid, with linear-lanceolate, acute segments. *h.* 1½ft. North America, 1827. SYN. *P. missourica* (B. R. 1412).

P. pyrenaica (Pyrenean). *fl.* deep golden-yellow, large, the petals very round, and overlapping, and twice as long as the calyx. Summer. *l.*, radical ones on long stalks, velvety or nearly smooth, with oblong leaflets, toothed towards the end; cauline ones three to five-lobed, on short stalks, and the upper ones entire. *h.* 8in. to 16in. Eastern and Central Pyrenees. A showy species, sometimes covered with adpressed hairs, and at others quite smooth.

P. Russelliana (Russell's). *fl.* of a rich blood-scarlet, nearly 2in. in diameter; petals obcordate. Summer and autumn. *l.* ternate, one-coloured beneath. *h.* 1ft. Hardy. A hybrid, probably between *P. argyrophylla atrosanguinea* and *P. nepalensis.* (B. M. 3470.)

P. Saxifraga (Saxifrage-like).* *fl.* white, in corymbose, subumbellate heads; petals nearly round, twice as long as the calyx. May and June. *l.* either of five leaflets, the central leaflets having short, partial petioles, and all being three-toothed, with connivent teeth, or of three leaflets, which are generally entire. Stem shrubby, with very short, densely-tufted branches. *h.* 4in. to 6in. Mentone. (F. M. x.)

P. Sibbaldia (Sibbaldia). *fl.* yellow, few, in terminal, close cymes; petals small. July. *l.* 1in. to 3in. long; leaflets ¾in. to 1in. long. Stems 3in. to 5in. long, axillary, ascending, leafy. Europe (Britain), North America. (Sy. En. B. 426.) SYN. *Sibbaldia procumbens.*

P. Tormentilla (Tormentilla). Blood-root. *fl.* bright yellow, small, and mostly with four petals; the first one of each stem has, however, frequently five. Summer. *l.*, lower ones shortly stalked; upper ones always sessile, with three, or rarely five, leaflets. Stems erect. Europe, &c. (Britain). (B. M. Pl. 101; Sy. En. B. 430.) SYN. *P. tridentata.*

P. tridentata (three-toothed). A synonym of *P. Tormentilla.*

P. unguiculata (clawed).* *fl.* pearly-white, ½in. in diameter, in open panicles with slender, spreading branches, peduncles, and pedicels; petals rather longer than the calyx lobes, rounded. July. *l.*, radical ones 4in. to 8in. long, petioled, narrow-linear, flexuous, sessile, consisting of three closely-packed leaflets; cauline ones more sessile, with more scattered leaflets. Stem 9in. to 12in. high, very slender. California. (B. M. 6560.) SYN. *Ivesia unguiculata.*

P. verna (spring). *fl.* bright yellow, in irregular panicles at the ends of the stems, with obcordate petals longer than the calyx. Spring. *l.* rigid; lower ones on long stalks, with five or seven, oblong or wedge-shaped, toothed leaflets; upper ones quinate or rarely ternate, nearly sessile. *h.* 6in. to 8in., but sometimes prostrate. Europe, &c. (Britain). A variable species. (Sy. En. B. 428.)

P. viscosa (clammy). *fl.* yellow, crowded at the tips of the branches into a few-flowered panicle; petals obovate, emarginate, hardly longer than the calyx. June to August. *l.* greenish on both surfaces, pinnate; leaflets oblong, sharply and deeply serrated, upper ones decurrent, lower ones small. *h.* 1ft. to 1½ft. Dahuria, 1797. (B. R. 1492.)

POTENTIL, MARSH. *See* **Potentilla Comarum.**

POTERIUM (the old Greek name, used by Dioscorides, from *poterion*, a drinking-cup; the foliage of Burnet having been used in the preparation of some medicinal drink).

Poterium—*continued.*

Burnet. Including *Sanguisorba.* ORD. *Rosaceæ.* A genus comprising about fifteen or twenty species of greenhouse or hardy, perennial (in one case annual) herbs, decumbent at base, very rarely spiny shrubs, inhabiting the whole of the temperate and warmer regions of the Northern hemisphere. Flowers at the tips of the scapes, densely capitate or spicate, small, bracteate and bibracteolate; calyx tube turbinate, persistent, constricted at throat; lobes four, petal-like, deciduous, imbricated; petals absent. Leaves alternate, impari-pinnate; petioles elongated, with an imbricated sheath at base; leaflets petiolulate, serrated, rarely entire. The herbaceous kinds thrive in any ordinary garden soil, and may be increased by seeds. The shrubs require a light, rich soil, and may be propagated by young cuttings, which will root readily under a glass. *See also* **Burnet.**

P. caudatum (tailed). *fl.* greenish, dicœious, sometimes six-cleft and trigynous; spikes elongated, cylindrical. January to April. *l.*, under surface, as well as the petioles and peduncles, villous. Branches unarmed. *h.* 2ft. to 3ft. Canary Islands, 1779. Greenhouse shrub. (B. M. 2341.)

P. officinale (officinal). Great Burnet. *fl.* dark purple; spikes ovate; stamens equalling the glabrous calyx. June to August. *l.* glabrous; leaflets ovate, rather cordate. *h.* 3ft. to 4ft. Europe (Britain). Perennial herb. SYN. *Sanguisorba officinalis* (Sy. En. B. 421).

P. Sanguisorba (Sanguisorba). Common Salad Burnet. *fl.* greenish or purplish; lower ones of the head male, upper ones female. June and July. *l.*, as well as the stems, glabrous; leaflets roundish-ovate. *h.* 1ft. to 2ft. Europe (Britain). Perennial herb. (Sy. En. B. 419.)

P. spinosum (spiny). *fl.* greenish, in oblong spikes. April to August. *l.*, leaflets smoothish, serrated. Branches rather villous, the ultimate ones terminating in spines. *h.* 2ft. to 3ft. South Europe, 1595. Hardy shrub. (S. F. G. 943.)

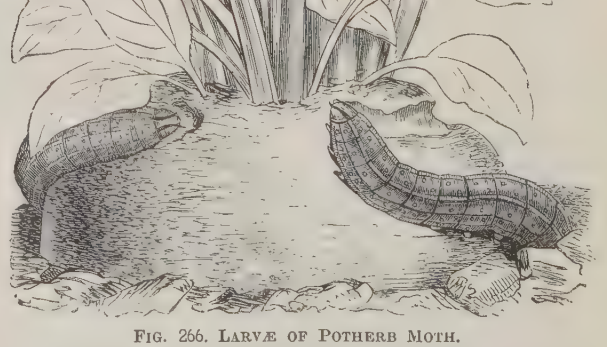


FIG. 266. LARVÆ OF POTHERB MOTH.

POTHERB MOTHS. Under this name are included numerous species of *Noctuidæ*, the larvæ of which devour the low-growing garden produce or potherbs, such as Cabbages, Turnips, Beets, Peas, Beans, Carrots, &c. The moths are nearly all dull-coloured, and mostly have a spread of wings of 1½in. to 2½in. They belong to groups for the most part already discussed (*see* **Mamestra,**

Potherb Moths—*continued.*

Noctua, Plusia); hence, it is unnecessary to repeat here what is to be found under these headings, as to the form and habits of the moths. The larvæ are long and worm-like (see Fig. 266), not hairy, and generally dull green, brown, or yellowish in colour, with longitudinal lines and black dots, though sometimes ornamented with brighter colours. They live hidden between the leaves of their food-plants, or underground upon roots of Turnips and other plants, and, unless looked for, are very seldom to be seen. Owing to their mode of life, they are apt to remain in Cabbages and other vegetables till cooked and sent to the table. It is hardly possible to get rid of them entirely, and the more so, since most of them feed largely on weeds, as well as on garden produce. *Hadena oleracea* sometimes gets the

FIG. 267 HADENA OLERACEA.

name of Potherb Moth, though not peculiarly destructive. For its appearance, see Fig. 267. The front wings are reddish-brown; there is a nearly white line parallel to the hind margin, and bent so as form a W nearly in the middle; the stigmas near the middle of the wing are margined with white scales, and the one nearer the tip (the reniform stigma) is of a dull ochreous colour. The hind wings are grey-brown, paler towards the

FIG 268. LARVA OF HADENA OLERACEA.

base, and the body is grey-brown. The larva (see Fig. 268) is usually some shade of dull greenish-grey, with many white dots, and a smaller number of regularly-arranged black dots along the body. The back is marked with three dull, darker lines lengthwise, and there is a white line running along the lower part of each side. The pupa is protected in an earthen cocoon.

Remedies. The larvæ of all kinds of Potherb Moths should be destroyed whenever seen. Hand-picking, though slow, is, perhaps, the surest method. Gas-lime is a very useful application, either used fresh in a narrow ring on the soil, round, but not touching, the stems of the plants, or after some months' exposure to air, when it should be dusted over the plants, so as to allow it to get between the leaves. Soot has also been successfully employed. Of course, such remedies render it necessary to thoroughly wash the plants before using them at table. The pupæ are often exposed when the soil is dug over in garden-

Potherb Moths—*continued.*

ing operations, and they should be destroyed. The moths may be attracted by light, or by "sugaring," and should be caught and killed.

Potherbs are also frequently damaged by hairy larvæ. Some account of these will be found under **Tiger Moths** (which *see*).

POTHOMORPHE. Included under *Piper.*

POTHOS (the Cingalese name of one of the species; the *Pothos* of Theophrastus is an entirely different plant). ORD. *Aroideæ* (*Araceæ*). Of this genus, about forty species have been enumerated, but, according to the "Genera Plantarum," not more than twenty are really distinct. They are much-branched, tall, stove, climbing shrubs, with the lower branchlets rooting, and those at the summit spreading, and inhabit Asia, Australia, the Pacific Islands, and (one species) Madagascar. Spathe small, ovate or conchoid, rarely elongated, reflexed, green, accrescent or persistent; spadix shorter than the spathe, long-stipitate, clavate, globose, or ovoid, often decurved, sometimes twisted or flexuous, clothed with perfect flowers, each of which has a perianth of six segments, fornicate at apex; peduncles leafy, sheathed, or naked. Leaves distichous, obliquely linear or ovate-lanceolate, the blade sometimes deficient; petioles winged or widened, and leafy. The species described below are the only ones worth growing, the others being more curious than ornamental. For culture, *see* **Anthurium.**

P. acaulis (stemless). A garden synonym of *Anthurium Hookeri.*

P. argyræa (silvery). A garden synonym of *Scindapsus argyræa.*

P. aurea (golden). *l.* strikingly variegated, of a dark green, boldly and irregularly marked by bands or fantastic-shaped blotches of creamy-yellow, here and there suffused with pale yellowish-green, cordate, ovate, acute, thick, fleshy. Solomon Isles, 1880. A very distinct and remarkable plant, of free growth; "probably some species of *Scindapsus* or *Raphidophora*" (N. E. Brown). (I. H. 387.)

P. cannæfolia (Canna-leaved). A synonym of *Spathiphyllum cannæfolium.*

P. celatocaulis (concealed-stemmed).* *l.* oblique, sessile, with a short, clasping sheath, broadly elliptic in outline, very obtuse at apex, and cordate at base, rich dark green; under surface pale green, and minutely crystalline. North-west Borneo, 1880. A handsome climber, lying perfectly flat upon the surface over which it climbs; it is a most desirable plant for covering walls, trunks of tree-ferns, &c. As the flowers of the plant are unknown, it is far from certain that it belongs to the genus *Pothos.* (F. d. S. 2419-20; I. H. n. s., 496.)

P. fœtidus (fetid). A synonym of *Symplocarpus fœtidus.*

P. Seemanni (Seemann's). *fl.*, spathe ovate or ovate-oblong, apiculate; spadix slightly longer than the stipes; peduncles short. May. *l.* lanceolate, acute, obtuse at base; petioles more or less cuneate, auriculate-rotundate, shorter than the blade. China, 1821. (B. R. 1337, under name of *P. scandens.*)

POTS AND POTTING. Pots are amongst the most essential of garden utensils, and on the proper execution of Potting depends materially the success attained in plant culture. Potting is a general term meant to imply that a plant is being first placed in a Pot, or transferred from one size to another for providing additional rooting space. Pots are generally made of clay, and as this varies in different localities, so do the articles made from it; from different potteries, too, the sizes and shapes vary considerably. In making Pots, a certain quantity of clay is called a "cast"; this is worked to make the number by which the sizes are in many places distinguished—thus, 48's, 32's, 24's, &c.—the two lesser numbers taking respectively the same quantity of clay to the cast as the other, but the Pots being in two larger sizes. In other places, the sizes are known by inches, as 5in., 6in., 8in., and so on. All Pots are made, or should be made, wider at the top than at the bottom; this is an essential provision for allowing the balls to be turned out without becoming broken. If the shape were cylindrical, or the bottom wider than the top, this would be an impossibility, as the ball becomes compressed inside to the same shape, and, in due course, is usually permeated

Pots and Potting—*continued.*

with roots. In order to supply plants with an amount of soil and root space somewhat in proportion to their several requirements, numerous sizes of Pots are indispensable. There are various sorts and shapes made, the most being of the ordinary description; while special ones are made for Orchids, and for other purposes, such as forcing Rhubarb and Seakale. Ordinary Pots are always provided with a hole at the bottom, for the escape of water; in some of the larger sizes, two or three in addition are made at the side, near the bottom. A rim is generally made round the top, but, in some potteries, small sizes are made without; one of the objects being that a larger quantity may be stood in a given space after they are filled with plants—the absence of rims allowing them to be arranged in a smaller compass. Orchid-pots are of greater width, in proportion to depth, than others of ordinary make; they are also much perforated at the bottom and sides, to insure the porosity and perfect drainage which these plants require, and to allow spaces for their roots to grow through and attach themselves to the outside surface. Blanching-pots used for forcing Rhubarb and Seakale are large and deep, and are provided with a movable top, for affording access to the interior without lifting off the whole. They are inverted over the plants in the reserve ground, or elsewhere in the open garden, and covered with leaves or fermenting material. These Pots are specially useful where forcing or forwarding is only requisite in spring, and not throughout the winter.

Some few cultivators favour glazed Pots in preference to those of the usual description, which are unglazed; but they are much higher priced, and, for several reasons, are not to be generally recommended. Glazed Pots do not need much attention to keep them clean, and plants grown in them require less water than in the others; but there is not the same degree of cohesion between the soil and Pot, which is most desirable for success in plant culture.

Besides the sorts of Pots already referred to, there are others known as the Alpine or Double-sided, and the Double-rimmed. The Alpine Pot is virtually two, one inside the other, a narrow space being allowed between them for filling with water, damp sand, or moss, for the purpose of preventing evaporation from the soil in which the plant grows. This end may be gained, to a certain extent, by the use of moss and two ordinary Pots of different sizes, one inside the other; but, if water is intended for filling the space between, only the best ware, as used for the Alpine Pot, would suit: the ordinary sort would be too porous. Double-rimmed Pots are used for propagating, when bell glasses are employed; an extra rim being made for the reception of the glass, which admits of all the space inside being occupied with cuttings. These Pots have few practical advantages, and are not extensively used. Shallow Pots are now in great demand, especially for Orchids: they may be suspended like baskets, and, being shallow, are often called pans.

Potting forms a most important part of the routine work of gardening; it has to be practised more or less almost daily in all extensive establishments. The work varies infinitely with the numerous subjects grown, as do also the requirements of different plants. Some need very firm, and others only moderately firm, Potting; and, again, one sort of plant will bear frequent, and what is termed large, shifts, while certain death would result with another were it similarly treated. A few general remarks may be given on this subject here; but it will be unnecessary to enter far into details, since these are given elsewhere under the several plants which specially require them, and the practice is one which can only be fully learned by long experience and close observation. The provision of proper and efficient drainage is always of great importance, and forms the first part of the Potting

Pots and Potting—*continued.*

process, except the preparation of soil and Pots. These latter should always be used clean and dry; they are best if washed; but when this is impracticable, a thorough rubbing-out is most essential. It may not be generally known that plants never turn out properly from Pots that are wet or dirty at the time they are used; sometimes, it is impossible to separate balls of earth without breaking them all to pieces, and so destroying, or at least injuring, the roots. Dry, clean Pots, and good drainage, are, therefore, important preparations for Potting. The proper soil will, of course, vary with the numerous plants about to be inserted therein, but a rule of general application is that of having it just sufficiently moist at the time of using. Wet soil cannot be properly worked in around the roots, and plants never succeed so well when placed in it; while a soil too dry cannot be rightly solidified in Potting, and is difficult to moisten through afterwards by watering. Soft-wooded plants may invariably have more soil added to their roots at one time than those of a hard-wooded nature: where Pots nearly as large again may be safely used with the one, the other would only require the least additional space. Spring is the season when Potting operations are naturally most active, as the period when new growth commences in so many plants, after comparative inactivity, is a good time to provide them with additional root-space

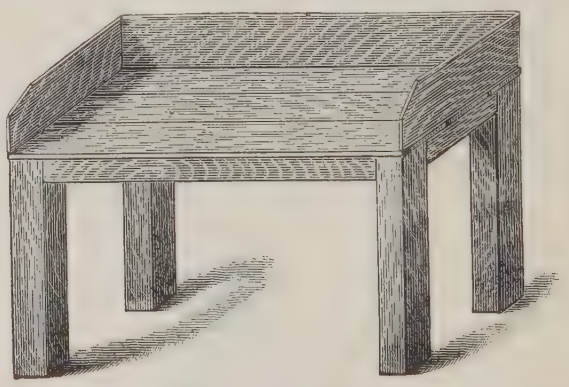


FIG. 269. POTTING-BENCH.

or whatever other attention they may require. In Potting hard-wooded plants of any description, the old ball should never be placed lower in the soil than it has previously been; if the stems are buried, certain death will, in most cases, be the result. These remarks apply more particularly to Heaths and numerous subjects of a like tender nature that are natives of Australia, the Cape, &c. In contrast to the class of plants just referred to, there are others which may have their stems buried at the time of Potting without the least fear of injury; these are mostly of the soft-wooded class, and need not be severally mentioned. Another point for reference is that of properly filling-in the space all round the old ball of earth. It is not an unfrequent occurrence, on turning a plant out after it has been shifted, to find the space round the lower part of the old ball only partly filled; this shows very inferior workmanship. If a plant is potted as it should be, all the additional soil given will have been rendered equally firm with the hand or hand-rammer, as the case may be, and thus the old and new soil will unite. Plants should never be Potted when the balls are dry or approaching dryness: they seldom get soaked afterwards when surrounded with soil of a moist nature, through which the water, when given, will pass readily, and leave the dry part to remain as before. The balls of earth and the soil used should, therefore, be as near

Pots and Potting—*continued.*

alike, regarding moisture, as may be practicable; either extreme must be avoided.

A strong Potting-bench is always requisite for the proper execution of work upon it. Unless the bench is firm, Potting on it is unsatisfactory, as the soil cannot be pressed or rammed unless the Pot rests upon a solid base. The shape and strength of material best suited for a strong Potting-bench are indicated in Fig. 269. Such a one made strong would last a very long time, and could be moved about to any part of the garden, if desired.

POTTERY-TREE. A common name applied to *Moquilea utilis.*

POTTLE. *See* **Measures.**

POUPARTIA. Included under **Spondias** (which *see*).

POUROUMA (the native name in Guiana). ORD. *Urticaceæ.* Of this genus of trees, about thirty species have been enumerated, natives of tropical South America. Flowers dicœcious, numerously disposed, the males in glomerules or cymose-paniculate heads, the females in cymes; peduncles axillary, solitary or twin. Mature fruit distinct, erect, much larger than in allied genera. Leaves alternate, long-stalked, undivided or sometimes on the same tree palmately three to five-fid or parted; stipules large, very caducous. *P. edulis*, the only species which calls for mention here, requires culture similar to **Artocarpus** (which *see*).

P. edulis (edible). *fr.* in clusters, of the form and taste of Hazel nuts (much esteemed by the natives of Columbia). *l.* green above, bluish-white beneath, as large as those of *Wigandia imperialis.* Cold regions of Columbian Cordilleras, 1873. Greenhouse.

POURRETIA. A synonym of **Puya** (which *see*).

POURRETIA FRIGIDA. A synonym of **Dyckia frigida** (which *see*).

POUS, PODOS. Used in Greek compounds, this signifies a foot or stalk; *e.g.*, Podosperm (the same as Funiculus), the stalk on which some seeds are borne.

PRÆCOX. Appearing or developing comparatively early.

PRÆMORSE. Having an irregular, ragged termination; appearing as if bitten off.

PRAIRIE CLOVER. *See* **Petalostemon.**

PRASANTHEA. A synonym of **Paliavana** (which *see*).

PRASINUS. Grass-green.

PRASOPHYLLUM (from *Prason*, a Leek, and *phyllon*, a leaf; in allusion to the similarity which exists in the leaves). ORD. *Orchideæ.* A genus comprising about twenty-six species of greenhouse, terrestrial orchids; two are natives of New Zealand, one is New Caledonian, and the rest are Australian. Flowers small, in loose or dense, sessile spikes; the perianth often abruptly inflexed above the ovary. Leaves in a long sheath, sometimes elongated, terete, sometimes reduced to a short mucro. The species are of botanical interest only.

PRATENSIS. Inhabiting meadows.

PRATIA (named after M. Prat-Bernon, of the French Navy, who accompanied Freycinet, but died a few days after the expedition sailed). SYN. *Piddingtonia.* ORD. *Campanulaceæ.* A genus comprising about fifteen species of usually slender, prostrate or creeping, rarely tall, ascendent or erect, greenhouse or hardy herbs, natives of Tropical Asia, Australia, New Zealand, and South America. Flowers often rather small, in many species abortive, dicœcious; calyx tube adnate, obovoid or turbinate; limb five-parted; corolla oblique, with incurved, oblique or sub-bilabiate lobes; peduncles axillary, one-flowered.

Pratia—*continued.*

Leaves alternate, frequently broad, toothed. For culture, *see* **Lobelia,** to which this genus is allied, and from which it principally differs in the fruit being a globose or obovoid berry, and not a dry capsule.

P. angulata (angled).* *fl.* white, nearly ½in. long, with the corolla tubular at the extreme base, and oblong, acute limbs; peduncles axillary, slender, 2in. long, ebracteate. Summer. *l.* shortly stalked, rather thick, sub-orbicular, truncate or rounded at the base, coarsely toothed. Stem creeping, slender, matted, with few large, scattered, spreading, white hairs. New Zealand, 1879. An extremely pretty little creeper for rockwork; quite hardy. SYN. *Lobelia littoralis.*

P. begoniæfolia (Begonia-leaved). *fl.* blue, small, on solitary pedicels. June to August. *fr.* purple, about the size of a Pea. *l.* roundish-cordate, serrated, petiolate, hairy on both surfaces, oblique at the base. Stems filiform, creeping, hairy. Nepaul, 1827. Greenhouse. (B. R. 1373.)

P. repens (creeping).* *fl.* white, with a violet tint, over ½in. long; corolla funnel-shaped, but split at the back; peduncles rather long, axillary, one-flowered. June to October. *l.* petiolate, rather reniform, undulately sub-crenated. Falkland Islands. A very pretty little hardy plant, well adapted for a sunny position on rockwork. SYNS. *Lobelia Pratiana, L. repens.*

PREMNA (from *premnon*, the stump of a tree; in allusion to the low stems of most species). SYN. *Baldingera.* ORD. *Verbenaceæ.* A genus comprising upwards of thirty species of glabrous, pubescent, or tomentose, stove shrubs, sub-shrubs, or trees, inhabiting the warmer regions of the Old World. Flowers white or bluish, small, disposed in terminal, trichotomous panicles, or in opposite cymes or clusters, forming a spike-like thyrse; calyx small, two-lobed or three to five-toothed; corolla tube short, cylindrical; limb spreading, four-fid. Leaves opposite, entire or toothed. Few of the species are cultivated in this country. They thrive in a compost of sandy loam, peat, and leaf mould, and may be increased by seeds, or by cuttings.

P. esculenta (edible). *fl.* disposed in small, terminal, contracted cymes; corolla yellowish-white. May. *fr.* purple. *l.* very short-stalked, oblong, acuminate, slightly narrowed at base, dentate. Branchlets and cymes farinaceously-puberulous. *h.* 6ft. to 8ft. East Indies, 1824. Shrub.

P. integrifolia (entire-leaved). Headache-tree. *fl.* strongly-scented, disposed in a loosely corymbose, terminal panicle; corolla greenish-white. July. *l.* short-stalked, ovate or oval, entire or crenate-toothed above, opposite, sometimes whorled, 2in. to 3in. long. *h.* 10ft. to 12ft. East Indies, 1827. Tree. SYNS. *P. serratifolia, P. spinosa.*

P. latifolia (broad-leaved). *fl.* disposed in terminal, axillary, pedunculate panicles; corolla dirty-white. June. *l.* stalked, rotundate-cordate or oval, 2½in. long, coarctate-acuminate or obtuse, entire or obsoletely repand above, shining above, pale beneath. *h.* 15ft. East Indies, 1827. Erect, branched shrub or small tree.

P. serratifolia (serrate-leaved). A synonym of *P. integrifolia.*

P. spinosa (spiny). A synonym of *P. integrifolia.*

PRENANTHES (from *prenes*, drooping, and *anthos*, a flower; on account of the drooping flower-heads). Including *Harpalyce* and *Nabalus.* ORD. *Compositæ.* A genus comprising about sixteen species of hardy, erect, often tall and sub-scandent, glabrous or rarely hispid herbs, of which six inhabit Central Europe, the East Indies, and the Canary Islands, and the rest are North American. Flower-heads homogamous, purple, violet, white, or yellowish-white, often slender, drooping, loosely paniculate, rarely in sheathed, racemiform, erect panicles; style often long-exserted; involucre cylindrical, often narrow; receptacle flat, naked. Leaves alternate, mostly petiolate, sagittate-cordate, deeply pinnatifid or lyrate, or the upper ones narrow, sessile, and auriculate-amplexicaul. The species are not particularly ornamental. They thrive in any ordinary garden soil. All may be increased by seeds, sown in the open border, and the perennial species also by division. Those described below are perennials.

P. alba (white). *fl.-heads* white; involucre purplish, of about eight scales; pappus deep cinnamon. Late summer and autumn. *l.* angulate or triangular-halbert-form, sinuate-toothed, or three to five-cleft. Stem corymbose-panicled at summit. *h.* 2ft. to 4ft. North America, 1762. (B. M. 1079.)

Prenanthes—*continued.*

P. purpurea (purple).* *fl.-heads* purple, disposed in loose panicles, long-stalked, nodding. August. *l.* oblong-lanceolate, cordate-amplexicaul, sub-denticulate, glaucous beneath. *h.* 4ft. Europe, 1658. (J. F. A. 317.)

P. virgata (twiggy). *fl.-heads* lilac, clustered, and mostly unilateral; involucre purplish, of about eight scales. August. *l.* lanceolate, acute, closely sessile, the upper ones reduced to bracts, the lower ones toothed or pinnatifid. Stem simple, 2ft. to 4ft. high. North America, 1823.

PREPTANTHE. A synonym of *Calanthe.*

PREPUSA (from the Greek word *prepo*, which means "I am handsome"; on account of the beauty of the flowers). ORD. *Gentianeæ.* A small genus (three species) of herbaceous or shrubby, erect, slightly branched, greenhouse plants, confined to Brazil. Flowers large, few, long-stalked, at length often nodding; calyx inflated, campanulate, shortly six-lobed; corolla campanulate, with six broad, short, twisted lobes. Leaves opposite, slightly fleshy, mostly approximate at the base of the stem; upper ones scattered, sessile or connate. For culture of *P. Hookeriana*, the only species hitherto introduced (probably not now in cultivation), *see* **Leianthus.**

P. Hookeriana (Hooker's).* *fl.* disposed in racemiform cymes of three to five; pedicels naked, elongated; corolla tube campanulate, the limb pale yellowish-white, with obovate, apiculate lobes. March. *l.* spathulate-lanceolate, slightly obtuse; cauline ones few, sub-connate at base. Stem herbaceous, purplish, almost simple. *h.* 1ft. 1839. (B. M. 3909.)

PRESCOTIA. *See* **Prescottia.**

PRESCOTTIA (named after John D. Prescott, a botanist, of St. Petersburgh). Erroneously spelt *Prescotia.* SYNS. *Decaisnea* (of Brogniart), *Galeoglossum.* ORD. *Orchideæ.* A genus comprising about a score species of stove, tropical American, terrestrial orchids, with fascicled, sometimes fleshy root-fibres, and leafy, slender, or tall, simple stems. Flowers small, spicate, sub-sessile; lateral sepals connate with the lip into a sac, the lip being fleshy, cucullate, and entire, with a couple of ears at its base. Leaves clustered at the base of the stem or radical, sessile or long-stalked, small or ample, membranous. The best-known species are given below. They are similar, both in habit and leaf characters, to *Stenorrhynchus*, and require a greenhouse temperature; they should be potted in well-drained loam.

P. colorans (coloured). *fl.* green, in a very long, erect, dense spike; petals subulate, ascendent; scape 2ft. long, glaucous-purplish. *l.* solitary, ovate-oblong, acuminate, cucullate at base, as long as the petioles. Brazil, 1834. (B. R. 1915.)

P. densiflora (dense-flowered). *fl.* whitish; sepals and petals revolute, almost round, acute, connate with the lateral sepals. *l.* rosulate, oblong, obtuse, many-nerved. Brazil, 1866.

P. plantaginea (Plantain-like). *fl.* greenish-white, disposed in a strict, dense, cylindrical spike; lip oblong, emarginate. *l.* erect, lanceolate-oblong, narrowed into a petiole which is shorter than the blade. Brazil, 1822. (H. E. F. 115; L. B. C. 990.)

PRESLIA (named in honour of C. B. and I. S. Presl, of Prague, authors of "Flora Sicula," 1818, "Flora Cechica," 1819, and other works). ORD. *Labiatæ.* A monotypic genus. The species is a hardy, prostrate, perennial herb, allied to *Mentha.* It thrives in any moist soil, and may be readily increased by divisions.

P. cervina (stag). *fl.* pale purplish, disposed in dense, many-flowered, axillary whorls, which are rather shorter than the floral leaves; calyx tubular, equal, four-toothed; corolla tube included, the limb equal and four-parted. June to August. *l.* sessile, linear, obtuse, quite entire, dotted, somewhat fascicled in the axils. Western Mediterranean region, 1684. SYN. *Mentha punctata.*

PRESTOEA (named after H. Prestoe, the present Director of the Trinidad Botanic Gardens). ORD. *Palmæ.* A genus comprising two species of pinnate-leaved, slender, dwarf, stove palms, with a reed-like caudex. For culture, *see* **Phœnix.**

P. montana (mountain). This is the correct name of the plant described in this work as *Euterpe montana.*

P. pubigera (puberulous).* *fl.* minute, sessile; outer spathe two-keeled, 5in. long, the interior one 1ft. to 1½ft. long; peduncle

Prestoea—*continued.*

2in. to 4in. long; spadix branches twenty to thirty, the inferior ones 6in. long, much thickened at the base. *fr.* an ovoid berry. *l.* 3ft. to 4ft. long, pinnatisect at base, on petioles more than 2ft. long, green, with pale nerves, glabrous, chartaceous; lower segments somewhat distant, 1½ft. to 2ft. long, three lines broad Trunk 10ft. to 12ft. high. West Indies. SYN. *Hyospathe pubigera.*

PRESTONIA (named in honour of C. Preston, M.D., a correspondent of Ray). SYNS. *Exothostemon* and *Hæmadictyon.* ORD. *Apocynaceæ.* A genus comprising about thirty species of tall, climbing, twining, hirsute, pubescent or glabrous, stove shrubs, natives of tropical America. Cymes often densely corymbose or almost umbelliform, pseudo-axillary, sessile or shortly pedunculate. Leaves opposite, penniveined. Perhaps the only species worthy of mention is the one here described. It should be grown in a stove, and potted in a light, loamy soil. It makes a pretty specimen when trained upon pillars or a balloon trellis. Propagated by cuttings, rooted under a bell glass, in bottom heat.

P. venosa (veined). *fl.* yellowish-green, pale in the centre, in drooping racemes. June. *l.* lanceolate, glabrous, beautifully traversed by crimson veins. St. Vincent, 1821. SYN. *Echites nutans* (B. M. 2473).

PRETTY FACE. *See* **Calliprora lutea.**

PRICKING OFF, or **PRICKING OUT.** A term in constant use, which is applied to the removal of small seedling plants from the position in which they have been reared, and their insertion in single pots, or at a wider distance apart in pots, pans, or beds, where there is more space in which they may grow. The object is that of encouraging growth, and getting plants sufficiently strong to be placed in their permanent quarters without fear of injury. Pricking Out is generally best practised so soon as the first leaves appear after those which the seed produces from its interior. The necessity for this work may be much lessened by thin sowing; but still there are numerous instances in which it is unavoidable. Small plants, when Pricked Out, must receive every attention until they become so far established as, to a certain extent, to take care of themselves, and get large enough for transplanting or potting permanently.

PRICKLES. Sharp, hard, conical elevations of the epidermis or epiphlœum.

PRICKLY PEAR. *See* **Opuntia.**

PRIESTLEYA (named after Dr. Joseph Priestley, 1733-1804, the famous chemist). Including *Achyronia.* ORD. *Leguminosæ.* A genus comprising fifteen species of greenhouse, often silky-villous shrubs, natives of South Africa. Flowers yellow, in terminal, crowded heads or racemes, or rarely axillary; standard sub-orbiculate; wings falcate-obovate; keel incurved, beaked or slightly obtuse. Pods oblong or broadly linear, oblique, compressed, two-valved. Leaves simple, entire; stipules none. The species thrive in sandy peat. Water must be carefully administered; if too much is given, the plants will die. Propagation may be effected by cuttings of very young wood, inserted in sand, under a glass, and kept free from damp.

P. ericæfolia (Heath-leaved). *fl.* capitate, terminal, or in fascicles in the upper axils of the leaves; keel fuscous-purple at apex. June and July. *l.* linear-lanceolate, rather acute, ¼in. long, with somewhat revolute margins, hairy beneath, but at length glabrous above. Branches and calyces silky. *h.* 1ft. to 3ft. 1812.

P. sericea (silky). *fl.* disposed in a short, terminal spike, and, as well as the leaves and branchlets, clothed with adpressed pubescence. June and July. Pods hairy. *l.* ovate, acute, flat, one-nerved. *h.* 2ft. to 3ft. 1794.

P. Thunbergii (Thunberg's). *fl.* axillary, pedicellate. July and August. *l.* lanceolate, acute, smooth, the margins beset with silky hairs. Branches hairy. *h.* 2ft. to 3ft. 1819.

P. vestita (clothed). *fl.* capitate. May and June. *l.* ovate, concave, obtuse, nerveless, glabrous above, but, as well as the calyces and branches, clothed with hairy wool beneath. *h.* 2ft. to 4ft. 1800. (A. B. R. 382, under name of *Liparia villosa*; B. M. 2223, under name of *L. vestita.*)

Priestleya—*continued.*

P. villosa (villous). *fl.* capitate. June and July. *l.* ovate-elliptic, acute, one-nerved, flat, and, as well as the branchlets, calyces, and pods, hairy on both surfaces. *h.* 2ft. to 4ft. 1774. (B. M. 3216.)

PRIMORDIAL. First in order of appearance. The term is usually applied to first leaves.

PRIMROSE. *See* **Primula vulgaris.** The name was also formerly used for *Privet.*

PRIMROSE, CAPE. *See* **Streptocarpus.**

PRIMROSE, EVENING. *See* **Œnothera biennis.**

PRIMULA (from *primus*, first; referring to the early flowering). Primrose. ORD. *Primulaceæ.* A genus comprising from seventy to eighty species of mostly hardy, alpine, perennial, rhizomatous herbs, natives of Europe and temperate Asia, a few American, one or two found in the mountains of Java, and one in the frigid region of South America. Flowers white, pink, purple, or yellow, umbellately or verticillately racemose, very rarely solitary, involucral-bracted, ebracteolate; calyx tubular, funnel-shaped, or campanulate, often inflated or angular, with five persistent lobes; corolla hypogynous, infundibuliform or hypocrateriform, with a short or elongated tube, and a limb of five flat or concave, spreading or incurved, imbricated lobes. Leaves all radical, usually obovate-spathulate, rarely orbicular and long-stalked, entire, toothed, or rarely lobed. The various beautiful Auriculas have been derived from *P. Auricula.* Five of the species are natives of Britain, and include the well-known common Primrose (*P. vulgaris*), Cowslip (*P. officinalis*), and Oxlip (*P. elatior*), of our meadows and woods. The species described in the following pages are hardy, except where otherwise stated.

Primulas are charming and exceedingly useful plants, adapted collectively for various decorative purposes and positions under glass, and also in the open air. In them are represented great diversity of habits and growth, some being very dwarf and slow growing, while others develop and flower as large plants in a comparatively short time. Many of the hardy species are excellent subjects for sunny positions on rockwork; but some that are rare should receive special attention, or be kept in pots in a cold frame. Primulas of any description may be successfully grown in pots, if kept in the proper positions and temperatures which the several species and varieties require. The hardy ones may be kept in cold pits or frames throughout the summer, such as those with a north aspect; in winter, they must also be kept cool, and allowed to rest. Damp is one of the greatest enemies to hardy Primulas in winter, but still their roots must never be allowed to become too dry. All the small alpine species and their varieties should have their crowns kept well above the soil, and be maintained in position by placing pieces of sandstone on either side. This provision against damping applies to those grown in pots, in the open border, or on rockwork: it is always advisable to support the—in many instances, tiny—plants in this way. Varieties of the hardy Primrose are well adapted for naturalising in woods or shady places along with the common sort. A quantity of plants for this purpose may readily be raised from seed, a good strain of which should be secured.

Propagation of the species of *Primula* is most generally effected by seeds. The varieties of any section seldom reproduce themselves true from seed, and these have therefore to be propagated by cuttings or divisions. Careful division sometimes affords a method of increase amongst rare species when seeds are not procurable, and also more frequently amongst others that are commoner. Seeds of the hardy species are best sown, soon after they are ripe, in shallow pots or pans of light soil; the seeds should be thinly covered, and the pots placed in a cold frame, and kept shaded. When the seedlings appear, they should be placed near the glass, and, in due course, pricked out, or inserted singly in small pots of soil similar to that in which the seeds were sown.

Primula—*continued.*

P. japonica, one of the finest, strong-growing species, succeeds well in pots for greenhouse decoration, and also when planted on rockwork or in the open border. The seeds of this species should be sown when ripe, and the plants, when raised, grown on to flower the second spring following. As they are very vigorous, rich soil and rather large pots should be provided for them after the first winter has passed. If the flowers appear on plants within a year after the seed has been sown, it is not so desirable as when they can be kept back until starting time, after two winters have passed. *P. japonica* never requires any fire-heat; all the leaves die down in winter, when the pots may be stored in a cold frame, and kept moderately, but not quite, dry. *P. obconica*, a pretty and very popular plant, is best adapted for pot culture; it flowers, more or less, in a cool greenhouse or conservatory, nearly all the year. Propagated, in spring, by carefully-made divisions, and by seeds. Another Primula well suited for pot culture in greenhouses is *P. cortusoides Sieboldii*, of which there are several beautiful varieties, all worthy of more extended culture than they at present receive.

Perhaps the best-known Primula is that which is very generally and extensively cultivated for greenhouse and room decoration from autumn till late in spring, namely, the Chinese Primrose (*P. sinensis*). Of this beautiful and popular species, there are single and double varieties, but plants of the former kind are more easily grown, and more frequently seen in gardens, than are those of the latter. These Primulas are always most acceptable in winter, when their bright and cheerful flowers appear to best advantage, and suggest the return of spring; at the latter season, however, the plants attain their greatest degree of perfection. To keep a succession of the single ones in flower, the first portion of seed should be sown in March, for growing plants in preparation for the ensuing autumn, and other sowings should be made in April, May, and June. Shallow pans are best for the seed; they should be well drained, and filled with light soil, composed chiefly of leaf mould, with a little loam and sand. The surface may be slightly pressed, to make it even, and the seeds must only be very lightly covered; the pans should then be placed in a warm frame or pit, and kept shaded. A pane of glass, laid over the top of each pan, will prevent rapid evaporation, and watering need not then be frequently practised until germination takes place. The young plants should be left in the seed-pans or pots until ready to pot off singly, unless any of them show signs of damping, in which case they are best pricked off at once in new soil, about 1in. apart, and kept shaded for a few days. In about a fortnight, a cold frame will be the most suitable place, as the plants must be kept near the light, and have plenty of air while growing, to insure what is most essential—a compact, sturdy habit. As the soil in small pots becomes filled with roots, shift on into others 5in. in diameter, a size sufficiently large for Chinese Primulas to flower in. For the final potting, an open and rather rich soil is necessary, consisting of two parts loam to one each of well-decayed manure and leaf mould, a little charcoal or sand being added to insure porosity. The pots should be clean, well drained, and perfectly dry when used. Ventilation, watering, and shading, are the principal points requiring attention in the general management. Throughout the summer, a slight shading, or screen from the sun's rays, is necessary through the hottest part of the day: a thick or continuous shading is more injurious than beneficial. Liberal supplies of water are required in summer; but towards autumn, and in the winter, it

Primula—*continued.*

must be carefully administered. A light, airy house, where the plants may be kept near the glass, is best for these Primulas, when in flower, during the winter or spring; and a temperature of from 50deg. to 55deg. is better, at that period, than a higher one. In potting, the plants should be inserted so that their bases just touch the soil when the work is completed; the crowns must not be buried, but, if situated too high, they are always tumbling about afterwards.

FIG. 270. PRIMULA AURICULA.

Double varieties of *P. sinensis* must be propagated by cuttings, but some of the semi-double forms reproduce themselves from seed. Old plants, after flowering, should be encouraged to start a little growth, when they may be cut up, and each division inserted as a cutting. Some cultivators surround the base of the stems with leaf mould, into which the roots grow, and, when the divisions are made, plants instead of cuttings are already fit for potting off. Double varieties require culture very similar to single ones after they are established, but they will bear a little higher temperature when flowering.

VARIETIES. Of *P. sinensis* there are several strains which receive separate names, but, for general purposes, distinct, fimbriated white and red varieties are, if kept separate, sufficient. A greater diversity can, however, be procured by purchasing or saving mixed seeds from good, large, fimbriated flowers. The strain is of great importance, as there are so many inferior ones. All vendors of seed, doubtless, endeavour to supply the best quality; but varieties degenerate so fast, and all the inferior ones produce seed so freely, that the reputed quality is not always to be relied on. *P. s. filicifolia alba, filicifolia rubra, fimbriata alba,* and *fimbriata rubra,* are those most commonly grown; other sub-varieties of *fimbriata* are: Alba Magnifica, Chiswick Red, Coccinea, Marginata, Meteor, Scarlet Gem, Village Maid, and Waltham White. Of double varieties, the old Double White is one of the best and most useful winter-flowering plants grown. There are a few double sorts with coloured flowers; they are very useful for cutting, but are not extensively cultivated.

P. acaulis flore-pleno (double, stemless). A garden name for *P. vulgaris flore-pleno.*

Primula—*continued.*

P. Allionii (Allioni's).* *fl.* mauve, with a white eye, large, about 1in. across, either solitary or in twos, on very short peduncles. April. *l.* obovate or sub-spathulate, when fully developed narrowed into a petiole, slightly and irregularly toothed. All parts of the plant, except corolla and capsule, are densely clothed with a short, glandular pubescence. Mountains north of Mentone. (Fl. Ment. 63.) *P. tyrolensis,* from the Tyrol, is a geographical form of this species.

P. altaica (Altaic).* *fl.* mauve or purplish-crimson, with a yellow centre, as large as those of the common Primrose, and numerously produced. Spring. *l.* obovate, younger ones lanceolate, sinuate-crenate, or nearly entire, obtuse, marked with narrow veins, and slightly mealy. *h.* 3in. to 6in. Altai, 1819. (P. M. B. xvi. 194.)

P. amœna (pleasing). A garden synonym of *P. cortusoides Sieboldii.*

P. Auricula.* Common Auricula. *fl.* of various colours, but normally yellow, umbellately disposed on many-flowered stalks; tube of corolla gradually widening upwards, nearly three times the length of the bell-shaped calyx. Spring. *l.* oblong-lanceolate or obovate, more or less minutely glandular-toothed, fleshy, glaucous-mealy. *h.* 3in. European Alps, 1596. A well-known species. See Fig. 270. (B. M. 6837; G. M., Ap. 24, 1886; J. F. A. 415; R. G. 194 and 195.) *P. Balbisii* is a pretty, yellow-flowered form. *P. Goebelii* is a natural hybrid, with brownish-violet flowers. For cultivation, varieties, &c., *see* **Auricula.**

P. auriculata (eared).* *fl.* purplish, with a white eye, five or six in a drooping umbel; corolla tube 1in. to 1½in. long, three times the length of the calyx, the lobes narrower than those of *P. farinosa.* Early summer. *l.* oblong or obovate, smooth, slightly crenate, pale but not mealy beneath. *h.* 4in. Austrian mountains, 1825. A pretty species, closely allied to *P. farinosa,* but readily distinguished by its much longer flowers. (B. M. 392, under name of *P. longifolia.*)

P. Balbisii (Balbi's). A form of *P. Auricula.*

P. Boveana (Bove's).* Abyssinian Primrose. *fl.* yellow, very numerous, on straight, axillary pedicels; corolla twice or thrice as long as the calyx, with a slightly-constricted throat. March. *l.*, lower ones rosulate, ovate, unequally argutely toothed; upper ones whorled, ovate or ovate-lanceolate, sessile, argutely incised-toothed, acuminate. *h.* 6in. Mount Sinai, 1826. Greenhouse. (B. M. 2842, under name of *P. verticillata.*)

P. calycina (calycine).* *fl.* purple, in short-stalked umbels. May and June. *l.* numerous, sessile, imbricated, oblong or broadly-lanceolate, acute, entire, with a horny, wavy margin, glossy-green above, glaucous beneath. 1838. Alps of Lombardy. (S. B. F. G. ser. i., t. 254, under name of *P. glaucescens.*)

P. Candolleana (De Candolle's). A synonym of *P. integrifolia.*

P. capitata (headed).* *fl.* deep violet-blue, in dense, round heads 1½in. across, and enveloped in a white, mealy powder; scapes from 6in. to 9in. high. April to June. *l.* oblong, mealy on the under side, sometimes of a golden hue, finely wrinkled and toothed. Himalaya, 1850. One of the finest species. It makes a fine pot-subject, but will not endure a heated greenhouse. It should be grown in a cold frame, with plenty of air, and may be

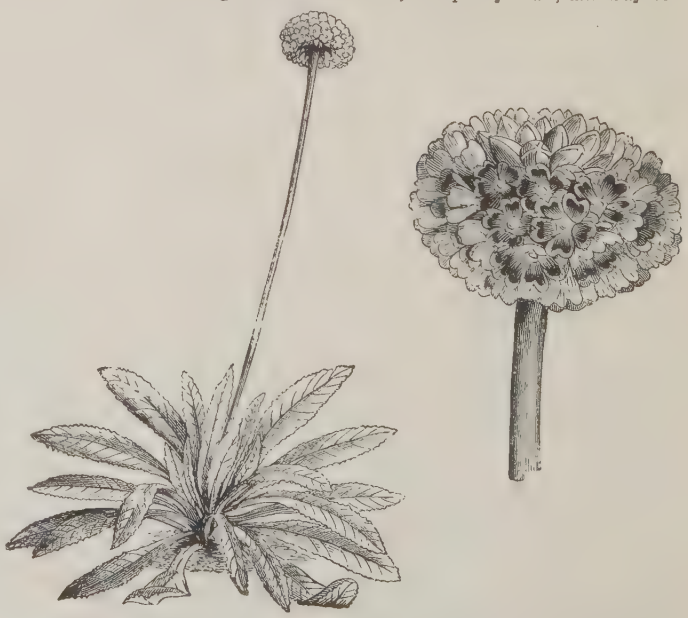


FIG. 271. PRIMULA CAPITATA, showing Habit and detached Inflorescence.

Primula—*continued.*

planted on rockwork where it will not get the midday sun. See Fig. 271. (B. M. 4550; R. G. 985.)

P. Clusiana (Clusius'). *fl.* bright rose, about 1in. in diameter, in stalked umbels. April and May. *l.* broadly ovate, slightly pubescent; margins obscurely toothed. *h.* 6in. to 9in. Tyrol. (J. H. ser. iii. vol. xi. p. 356.)

P. cortusoides (Cortusa-like).* *fl.* deep rose, disposed in umbels; scapes about 6in. long. Early summer. *l.* large, soft, cordate, almost lobed, crenated, wrinkled, on stalks 2in. to 4in. long. *h.* 6in. to 10in. Siberia, 1794. Very distinct. (A. B. R. i. 7; B. M. 399.)

FIG. 272. PRIMULA CORTUSOIDES SIEBOLDII, showing Habit and detached Single Flower.

P. c. Sieboldii (Siebold's).* *fl.* fine deep rose, with a white eye, but very variable, from 1in. to 1¾in. across; umbel six to ten-flowered. April. *l.* ovate, the larger ones somewhat cordate at the base, coarsely and irregularly toothed, 2in. to 3in. long, and nearly as much broad. Root creeping. *h.* 8in. to 12in. Japan, 1865. A variety larger and handsomer than the type. See Fig. 272. (B. M. 5528.) SYN. *P. amœna* (of gardens).

P. Courtii (Court's). A synonym of *P. verticillata simensis.*

P. davurica (Dahurian). *fl.* pink, with a lemon-coloured eye; corolla hypocrateriform, with obcordate, emarginate lobes; involucre many-flowered. May. *l.* lanceolate-spathulate, subentire, glabrous. *h.* 3in. Dahuria, Siberia, 1806. (B. M. 1219, under name of *P. intermedia.*)

P. decora (decorous). A variety of *P. viscosa.*

P. denticulata (toothed).* *fl.* bright lilac, small, in dense, round heads or umbels, each blossom being about ½in. across, with a prettily-cupped corolla; scape long, somewhat dark-coloured. Spring and early summer. *l.* oblong-lanceolate, wrinkled, toothed, hairy on both surfaces, and densely so underneath, where they are also more or less covered with a white mealiness. *h.* 8in. to 12in. Himalaya. A handsome species, thriving best in a moist position, and in leaf mould. (B. M. 3959; B. R. 1842, 47; S. E. B. ii. 114.) *P. d. pulcherrima* is a great improvement on the type; it grows from 10in. to 12in. high, and has a more globular flower-truss, of a deeper lilac colour.

P. d. cashmeriana (Kashmir).* *fl.* light purple, with a yellow eye, small, and densely arranged in globular trusses; scape from 9in. to 12in. high, very stout and mealy, thickening near the top. March to May. *l.* oblong, serrated, pale green, the under surfaces beautifully covered with a meal resembling gold-dust. Kashmir, 1879. A handsome variety, preferring a moist situation, where it will endure any amount of sunshine. During winter, the crowns are liable to rot, from the amount of moisture lodging therein; it is advisable, therefore, to place a piece of glass over them. See Fig. 273. (F. M. n. s. 360; R. H. 1880, p. 330.)

P. elatior (taller). True Oxlip. *fl.* pale yellow, horizontal or drooping, disposed in peduncled umbels; scape from throat open, without folds. April and May. *l.* on winged petioles. *h.* 1ft. Europe (Britain). This species differs from *P. vulgaris* in the less inflated calyx, shorter pedicels, and capsule longer than the calyx tube. It is intermediate between that species and *P. officinalis.* (Sy. En. B. 1131; B. R. 896 and L. B. C. 1585, under name of *P. Pallasii.*) *P. e. amœna* is a pretty form from the Caucasus, with purple flowers. (B. M. 3252, under name of *P. amœna.*)

P. elegans (elegant). A garden synonym of *P. sibirica kashmiriana.*

P. erosa (bitten). *fl.* in dense, umbellate heads, lavender or purple, covered with meal. Early spring. *l.* oblong-spathulate

Primula—*continued.*

or oblanceolate, coarsely and unevenly toothed. *h.* 4in. to 8in. Himalaya. Similar to *P. denticulata.*

FIG. 273. PRIMULA DENTICULATA CASHMERIANA, showing Habit and detached Single Flower.

P. farinosa (mealy).* Bird's-eye Primrose. *fl.* light purple, with a yellow eye, about ½in. across, arranged in compact umbels, on a stalk longer than the leaves; corolla tube about equalling

FIG. 274. PRIMULA FARINOSA, showing Habit, and detached Umbel of Flowers and Leaf.

Primula—*continued.*

the mealy calyx, the lobes narrow and deeply notched. Early summer. *l.* small, about 1in. long, ovate-oblong, roundly toothed, smooth above, clothed beneath with a white, mealy down. *h.* 3in. to 12in. Northern and Central Europe (Britain). A little gem; a stiff soil and a damp situation suit it well, and it should be screened from the midday sun. See Fig. 274. (L. B. C. 1649; Sy. En. B. 1134.) *P. f. acaulis* is a diminutive variety.

P. Fedtschenkoi (Fedtschenkow's). *fl.* deep violet-purple, in whorls after the manner of *P. japonica*. Summer. *l.* oblong-obovate, hardly crenated, almost sessile. *h.* 6in. to 9in. Turkestan, 1884.

P. Florkiana (Flörke's). *See* **P. minima.**

P. floribunda (bundle-flowered).* *fl* yellow, small, disposed in whorls, on erect scapes, 4in. to 8in. high. *l.* stalked, elliptic-lanceolate, toothed, glandular-pubescent. Western Himalayas, 1883. A charming plant. (B. M. 6712.)

P. glutinosa (glutinous).* *fl.* brilliant bluish-purple, with the divisions rather deeply cleft, nearly sessile, clustered. Early summer. *l.* lanceolate wedge-shaped, obtuse, smooth; margins serrated. *h.* 4in. South Europe, 1824. A very beautiful and distinct species, rarely seen in cultivation. (J. F. A. v. App. 26.)

P. Goebelli (Goebl's). *See* **P. Auricula.**

P. grandis (large). *fl.* yellow, on long pedicels, umbellate; scape long. *h.* 9in. Central Asia, 1878. A distinct species, remarkable only for the large size of its foliage and the smallness of its flowers. (R. G. 968.)

P. imperialis (imperial). A synonym of *P. prolifera.*

P. integrifolia (entire-leaved). *fl.* rose, from one to three on scapes 2in. to 3in. long; corolla deeply lobed; tube longer than the calyx. Spring and early summer. *l.* elliptic or oblong, entire, smooth, shining, ciliate at the edge. *h.* 3in. Pyrenees and Switzerland, 1792. An elegant little species. (B. M. 942; J. F. A. iv. 327; L. B. C. 886.) SYN. *P. Candolleana.*

P. involucrata (involucred).* *fl.* creamy-white, with a yellowish eye, disposed in umbels; corolla lobes roundish; involucre membranous, much divided. Spring. *l.* erect, oblong-lanceolate, bright green, narrowed into the leafstalk. *h.* 5in. to 7in. North India, 1845. A distinct species, requiring a moist situation; it thrives freely in pots plunged half-way in water. (B. R. xxxii. 31; R. G. 1863, 394.)

P. i. Munroi (Captain Munro's).* *fl.* white, with a yellowish eye, fragrant, in a head on stems 5in. to 7in. high; corolla inflated above the middle, with rounded, two-cleft lobes, more than 1in. across. March to May. *l.* long-stalked, nearly cordate, obtuse, slightly indented, smooth. *h.* 6in. to 8in. North India, 1845. (B. R. xxxiii. 15, under name of *P. Munroi.*)

P. japonica (Japanese).* Japanese Primrose. *fl.* variously coloured, crimson, maroon, lilac, rosy-pink, or white, with a differently-coloured eye, and about 1in. in diameter; scapes from 1ft. to 2ft. high, bearing five or six many-flowered whorls. Spring. *l.* large, oblong-spathulate, coarsely irregularly and sharply-toothed, sessile. *h.* 1ft. to 1½ft. Japan, 1871. One of the most beautiful hardy perennials in cultivation. It makes vigorous growth in moist, shady spots, in deep, rich loam. The seeds sometimes take a considerable time to germinate; they come up quickly, however, if sown so soon as they are ripe. (B. M. 5916.)

P. Kaufmanniana (Kaufmann's). *fl.* glossy-violet, in two whorls of from ten to eighteen, almost 1in. broad. Summer. *l.* softly pubescent, long-stalked, orbicular, with a deeply cordate base, lobed; lobes irregularly serrated. *h.* 6in. to 12in. Turkestan, 1883.

FIG. 275. PRIMULA LUTEOLA, showing Habit and detached Single Flower.

P. luteola (yellowish).* *fl.* pale or sulphur-yellow, deepening to a golden-yellow about the throat, numerously disposed in compact, roundish heads, elevated on tall scapes usually about 1ft. in height. Summer. *l.* oblong, 6in. to 12in. long, narrowed towards the base and toothed at the margin. *h.* 1½ft. to 2ft. Caucasus, 1867. A handsome species, requiring a moist situation in full exposure. See Fig. 275. (R. G. 541.)

Primula—*continued.*

FIG. 276. PRIMULA MARGINATA.

P. marginata (margined).* *fl.* violet-rose, with a mealy throat; scape many-flowered. April and May. *l.* oblong or obovate, deeply and unequally toothed; margins silvery from mealy dust. *h.* 2in. to 4in. Switzerland, 1777. A very pretty and distinct species. See Fig. 276. (B. M. 191; Fl. Ment. ii.; L. B. C. 270.) There is a form known as *major*, which is larger in all its parts, and has deeper-coloured flowers, than the type.

P. minima (least).* Fairy Primrose. *fl.* usually rose, but sometimes white, comparatively large, generally nearly 1in. across, solitary, but sometimes twin. Summer. *l.* wedge-shaped, nearly square at the ends, about ½in. long, smooth, shining, toothed at the top. *h.* 1½in. South Europe, 1819. A very small-growing species, requiring a sandy-peat and loam soil. (B. R. 581; L. B. C. 315.) *P. Florkiana* is like this; it is a hybrid, of which *P. minima* is one of the parents.

P. mistassinica (Lake Mistassini). *fl.* red; corolla hypocrateriform, with obcordate, sub-emarginate lobes; involucre one to eight-flowered. June. *l.* veined, spathulate, dentate or crenate, obtuse or acute, glabrous, sub-coarctate at base. *h.* 3in. North America, 1818. (B. M. 2973; H. E. F. 68.) SYN. *P. pusilla* (B. M. 3020; L. B. C. 1726).

P. mollis (soft).* *fl.*, calyx and corolla tube red, the spreading limb deep rose, with a dark blood-coloured ring round the eye; scapes 1ft. to 1½ft. high, bearing three or four whorls of blossoms, each of which is nearly 1in. across. May. *l.* long-stalked, cordate, hairy on both surfaces, the petioles clothed with spreading white hairs. Bootan, Himalaya, 1854. A very distinct and rare species. (B. M. 4798.)

FIG. 277. UMBEL AND DETACHED SINGLE FLOWER OF PRIMULA OFFICINALIS.

Primula—*continued.*

P. nivalis (snowy).* *fl.* pure white, freely produced in large trusses on stems as high again as the leaves; corolla lobes obcordate. Spring. *l.* obovate or spathulate, ciliated, smooth, flat, sharply and irregularly toothed. *h.* 4in. to 9in. Caucasus, &c., 1790.

P. n. farinosa (mealy). *l.* mealy beneath. Central Asia, 1878.

P. n. longifolia (long-leaved). *fl.* dark violet. *l.* ovate-oblong to lanceolate-oblong. Central Asia, 1878. (R. G. 930.)

P. n. turkestanica (Turkestan). *fl.* rose, generally in two dense whorls, and about 1in. in diameter. *l.* oblong, flat, obtuse, smooth above, white below. *h.* 6in. Turkestan, 1878. One of the handsomest varieties in cultivation. (R. G. 930.)

P. obconica (obconical).* *fl.* pale lilac or purplish, drooping, umbellate; calyx between campanulate and funnel-shaped; corolla with a cylindric tube and a flat limb 1in. in diameter. Spring and summer. *l.* radical, many, petioled, broadly ovate-oblong, cordate or rounded-cordate, the margins lobulately toothed or nearly entire. *h.* 6in. to 12in. Central China, 1882. (G. C. n. s., xix. 121; Gn., Sept., 1884.) SYN. *P. poculiformis* (B. M. 6582).

P. officinalis (officinal). Cowslip; Palsywort. *fl.* bright yellow, in terminal umbels, hanging more or less to one side; calyx lobes obtuse; corolla limb cup-shaped. Spring and summer. *l.* generally smaller than those of the common Primrose, much narrowed towards the base, thickly pubescent with short, stiff hairs. *h.* 4in. to 12in. Europe (Britain), West Asia. A well-known plant, from which the Polyanthus (*P. variabilis*) is supposed to have originated. See Fig. 277. (Sy. En. B. 1130; L. B. C. 1597, under name of *P. inflata.*) SYN. *P. veris.* *See also* **Polyanthus.**

FIG. 278. UMBEL AND DETACHED FLOWERS OF PRIMULA OFFICINALIS ELATIOR DUPLEX.

P. o. elatior duplex (taller, double). A curious garden form, with a petaloid calyx. See Fig. 278.

FIG. 279. UMBEL AND DETACHED SINGLE FLOWER OF PRIMULA OFFICINALIS MACROCALYX.

P. o. macrocalyx (large-calyxed). A garden form, with the calyx foliaceous, and abnormally developed. See Fig. 279.

P. Palinuri (Palinuri). *fl.* bright yellow, with a Cowslip-like perfume and a funnel-shaped corolla, disposed in a drooping umbel at the top of the powdered scape. April and May. *l.* broad-spathulate, smooth, sharply and unequally toothed, bright pale green, almost as large as those of young Cabbages. *h.* 6in. to 9in. Palinuri, Southern Italy, 1816. A vigorous-growing and distinct species. (B. M. 3414; H. E. F. 118.)

P. Parryi (Parry's).* *fl.* bright purple, with a yellow eye, nearly 1in. across; scapes long and stout, bearing about a dozen fine large blossoms in a panicle at the top. Spring. *l.* erect, narrowly obovate-oblong, obtuse or sub-acute, sessile or narrowed into the very broad petiole, obscurely toothed or entire, 5in. to 9in. long. *h.* 6in. to 18in. Rocky Mountains, 1865. A beautiful, large species. (B. M. 6185.)

Primula—*continued.*

P. poculiformis (cup-shaped). A synonym of *P. obconica.*

P. prænitens (very glossy). A synonym of *P. sinensis.*

P. prolifera (proliferous). *fl.* yellow, ½in. in diameter; scape tall, bearing several whorls of flowers. *l.* large, obovate-oblong, denticulated along the margins. *h.* 6in. to 24in. Himalaya and Java, 1884. A very distinct and pretty species. (B. M. 6732; R. G. 1204.) SYN. *P. imperialis.*

P. pubescens (downy). *fl.* rosy-crimson, in very large heads. April. *l.* obovate-oblong, dentate-serrate at apex, the margins densely glandular-ciliate. *h.* 3in. to 6in. South Europe, 1800. A fine hybrid, of which *P. Auricula* is one of the parents. (R. G. 1198A.)

FIG. 280. PRIMULA SIKKIMENSIS, showing Habit and detached Single Flower.

P. pusilla (weak). A synonym of *P. mistassinica.*

P. rosea (rosy).* *fl.* bright rosy-carmine, with a yellow eye, nearly 1in. across, disposed in heads of from six to ten blossoms, on stout scapes 4in. to 6in. high. Spring. *l.* pale bright green, smooth, 3in. to 6in. long, in shape resembling those of the common Primrose, but not wrinkled; edges slightly serrated and crimped. *h.* 4in. Kashmir, 1879. A handsome species, with a neat habit. (B. M. 6437; F. M. n. s. 360.)

P. sapphirina (sapphire-coloured).* *fl.* pale blue, borne on slender scapes 1in. to 2in. high. *l.* spathulate-obovate, obtuse, toothed, disposed in rosettes about ½in. in diameter. Sikkim (at 13,000ft. to 15,000ft. elevation), 1884. A minute species. (G. C. n. s., 1884, xxi. p. 545.)

P. scotica (Scotch).* *fl.* rich purple, with a yellowish eye; tube of corolla about equalling the calyx and twice as long as the lobes; umbel few-flowered. June. *l.* obovate-lanceolate, toothed, even, powdery on both sides. *h.* 2in. to 4in. Scotland. A lovely little species, very like *P. farinosa*, but smaller, and proportionately stouter. (L. B. C. 652; Sy. En. B. 1135.)

P. sibirica (Siberian). *fl.* red; corolla campanulate, the segments lanceolate-ovate or lanceolate, acute or slightly obtuse; involucre three to five-flowered. May. *l.* slender, flat, smooth, obovate, entire, obtuse, very glabrous, long-petioled, with undulated margins. *h.* 3in. Siberia, 1818. (B. M. 3167.) *P. s. integerrima* is a variety with very entire leaves. (B. M. 3445.)

P. s. kashmiriana (Kashmir). *fl.* rosy-lilac, in stalked umbels. June. *l.* long-stalked, ovate-elliptical. *h.* 6in. Western Himalaya, 1879. A handsome, glabrous species. (B. M. 6493.) SYN. *P. elegans*, of some gardens.

P. sikkimensis (Sikkim).* *fl.* pale yellow, nearly 1in. long and more than ½in. across, numerously disposed in large umbels, which sometimes produce as many as sixty blossoms; scapes from 1½ft. to 2ft. high. Summer. *l.* rough, wrinkled, obovate-oblong, obtuse, bidentate, attenuated into a footstalk. *h.* 1½ft. to 2ft. Sikkim Himalaya, 1850. See Fig. 280. (B. M. 4597.)

P. sinensis (Chinese).* Chinese Primrose. *fl.* white or pale lilac, normally small, the edges of the limb quite smooth, with a terminal notch in each segment. Spring. *l.* fleshy, with sinuated

Primula—*continued.*

FIG. 281. PRIMULA SINENSIS.

edges and hairy surface. *h.* 9in. China, 1820. Greenhouse. See Fig. 281. (B. M. 2564; H. E. F. 105; L. B. C. 916, 1926; L. C. B. 7; R. G. 1861, 346.) SYN. *P. prœnitens* (B. R. 539). Of this now very extensively-grown species, a considerable number of varieties, differing both in foliage and flower characters, have

FIG. 282. PRIMULA SINENSIS FLORE-PLENO.

originated in gardens. There is a good strain of double forms, with a rather large range of colour variation. One is represented in Fig. 282.

P. spectabilis (showy). *fl.* deep rosy-purple, six to eight in an umbel; scape 3in. to 4in. high. July. *l.* elliptic, thick and fleshy, with entire, cartilaginous margins. *h.* 4in. Eastern Alps, 1879.

P. s. Wulfeniana (Wulfen's).* A form with more pointed leaves than those of the type. See Fig. 283.

P. Steinii (Stein's).* *fl.* bright purple, very shortly stalked. April and May. *l.* spathulate-obovate, toothed. A handsome hybrid (of which *P. minima* is one of the parents), of very dwarf, densely-tufted habit. (R. G. 991, f. 1-3.)

P. Stuartii (Stuart's).* *fl.* rich golden-yellow, in many-flowered umbels. Summer. *l.* nearly 1ft. long, broadly lanceolate, smooth above, mealy below, sharply serrated. *h.* 9in. to 18in. Northern India, 1845. A handsome and vigorous-growing species, requiring a good, light, and deep soil. See Fig. 284. (B. M. 4356.)

P. suffrutescens (sub-shrubby). *fl.* rosy-purple, with a yellow eye, 1in. in diameter, disposed in umbels. Spring. *l.* narrow,

Primula—*continued.*

cuneate-spathulate, 1½in. to 2in. long, toothed at the apex. Stems long, straggling, somewhat woody. California, 1884. A pretty rockwork plant.

FIG. 283. PRIMULA SPECTABILIS WULFENIANA.

P. tyrolensis (Tyrol). *See* **P. Allionii.**

FIG. 284. PRIMULA STUARTII, showing Habit, detached Inflorescence, and Single Flower.

P. variabilis (variable), of Goupil. A hybrid plant, which not unfrequently occurs wild in Britain, in company with its two parents, the Primrose and the Cowslip. It is often taken for the true Oxlip (*P. elatior*). See Fig. 285.

P. venusta (charming). *fl.* purple; corolla thrice as long as the calyx; involucre much shorter than the pedicels; scape glabrous. April. *l.* ovate, dentate, serrate, or almost entire, glabrous on both surfaces. *h.* 3in. Hungary, 1833. (B. R. 1983.)

P. veris (spring). A synonym of *P. officinalis.*

P. verticillata simensis (whorled, Simen).* *fl.* yellow; scape bearing two or three tiers or whorls of flowers, the stalks of which measure some 2in. in length; the whorls provided with spreading, leafy bracts, those in the lower whorls being the largest, measuring 4in. to 5in. long, and 1½in. broad; corolla salver-shaped, with a tube nearly 2in. long, dilated at the upper extremity, the lobes notched. Spring. *l.* oblong-lanceolate, 8in. to 10in. long, covered with white, mealy powder, especially on the lower surface, irregularly dentate. *h.* 1ft. to 1½ft. Abyssinia, 1870. A very desirable, greenhouse species. (B. M. 6042.) SYN. *P. Courtii.*

P. villosa (villous). A synonym of *P. viscosa.*

P. viscosa (clammy).* *fl.* rosy-purple, with a white eye, disposed in umbels on viscid scapes; corolla lobes cordate, gashed, the tube twice as long as the bell-shaped calyx. Early

Primula—*continued.*

FIG. 285. PRIMULA VARIABILIS.

summer. *l.* obovate or sub-orbicular, with closely-set teeth, dark green, covered with glandular hairs, and viscid on both sides. *h.* 2in. to 4in. Pyrenees, 1768. A handsome species. See Fig. 286. (B. M. 14; J. F. A. v. App. 27; L. B. C. 182; R. G. 656.) SYN. *P. villosa. P. decora* is a slight variety of this species (B. M. 1922; L. B. C. 1480.)

FIG. 286. PRIMULA VISCOSA, showing Habit and detached Umbel of Flowers.

P. v. latifolia (broad-leaved). *fl.* violet, with mealy throat and calyx, fragrant; umbel from one to twenty-flowered. Early summer. *l.* obovate or oblong, sometimes 4in. long, and nearly 2in. broad, serrately toothed from middle upwards, ciliate, hairy on both surfaces. *h.* 4in. to 8in. Pyrenees, 1820. (Fl. Ment. 12; R. G. 122.)

P. v. pedemontana (Piedmont).* *fl.* rosy-purple, with a yellowish-white eye, collected into a dense head, on scapes from 2in. to 4in. in height; throat of corolla not farinose. Spring. *l.* oblong or ovate, obsoletely repand-toothed, with fimbriated margins. *h.* 6in. Piedmont, 1826. (B. M. 5794.)

P. vulgaris (common).* Common Primrose. *fl.* usually pale yellow, with a flat limb; calyx tube inflated, five-angled; lobes acuminate; umbels sessile, giving the appearance of being solitary. Spring. *l.* tufted, sessile. *h.* 3in. Europe (Britain). (Sy. En. B. 1129.) There are numerous garden forms of this species (frequently met with under the name of *P. acaulis*), a double-flowering one being represented by Fig. 287.

PRIMULACEÆ. A natural order of herbs, of variable habit, usually with a perennial rhizome, very rarely sub-shrubby at base; they mostly inhabit Northern temperate (especially alpine) regions, being rare in the

Primulaceæ—*continued.*

Southern hemisphere, and very scarce in the tropics. Flowers hermaphrodite, usually regular, small or rather large, sometimes axillary and solitary, often racemose, or solitary or umbellate at the apex of an elongated scape, the inflorescence centripetal; calyx free, or very rarely adnate to the ovary, four to nine-fid or parted, usually persistent; corolla hypogynous, generally gamopetalous, rotate, hypocrateriform, or infundibuliform-campanulate, with a short or elongated tube; limb four to nine-parted or four to six-lobed, the lobes or segments entire, emarginate, or fimbriate-lacerate, imbricated or twisted in æstivation, rarely sub-bilabiate or wanting; stamens as many as the corolla lobes. Capsule one-celled. Leaves exstipulate, sometimes all radical, sometimes cauline, alternate, opposite, or whorled, simple or rarely lobed (in *Hottonia*, pectinate and multifid). The species are more remarkable for their beauty than for the little economic value they possess. Most of the flowers are sweet-scented. The order comprises twenty-one genera, and about 250 species. Well-known illustrative genera are: *Androsace, Cyclamen, Lysimachia,* and *Primula.*

PRINCE ALBERT'S YEW. *See* **Saxegothea conspicua.**

FIG. 287. PRIMULA VULGARIS FLORE-PLENO, showing Habit and detached Flower.

PRINCE'S FEATHER. *See* **Amaranthus hypochondriacus.**

PRINOS. This genus is now included, by Bentham and Hooker, under **Ilex** (which *see*).

PRIONIUM (from *prionion*, a small saw; alluding to the serrated leaves). ORD. *Juncæ.* A monotypic genus. The species is a remarkable, greenhouse rush, found in swamps and on the banks of rivers in South Africa. In its native habitat, it often increases to such an extent as to choke the rivers in which it grows. The leaf-sheaths contain a network of strong, black fibre, suitable for brush-making; and the leaves themselves are useful for plaiting and thatching. It should be grown in a compost of loam and leaf mould, and the pot stood in a pan of water. Propagated by division.

P. Palmita (Palmiet, native name). Palmite Rush. *fl.* greenish-golden, small, similar to those of *Juncus*, sessile or very shortly pedicellate, disposed in a compound, pedunculate panicle 4ft. long. *l.* in a cluster at the top of the caudex, 2ft. to 3ft. long, linear, dilated at base into an imbricating sheath. *h.* 6ft. 1857. (B. M. 5722.)

PRISMATOCARPUS (from *prisma, prismatos*, a prism, and *karpos*, a fruit; alluding to the long, prismatic form of the fruit). ORD. *Campanulaceæ.* A genus comprising fifteen or sixteen species of green-

Prismatocarpus—*continued.*

house or hardy, glabrous, perennial herbs or sub-shrubs, confined to South Africa. Flowers at the tips of the branches, short, solitary or glomerate, or disposed in dichotomous, slender, slightly rigid panicles; calyx with an adnate, linear tube, and a five-cut or five-parted limb; corolla infundibuliform or broadly campanulate, five-lobed; inflorescence centrifugal. Leaves alternate, small or narrow, in the lower part of the stem, often fasciculate in the axils. For culture of *P. nitidus*—the best-known species—*see* **Campanula.** *See also* **Specularia.**

P. nitidus (shining). *fl.* white, two to four in a cluster towards the tops of the branches, sessile in the axils of the bracts, and sometimes solitary in the axils of the leaves; bracts similar to the leaves. August and September. *l.* ovate-oblong, spreading, serrated. Stem branched; branches diffuse, woody. *h.* 6in. to 12in. 1787. Greenhouse. (B. M. 2733, under name of *Campanula Prismatocarpus.*)

PRITCHARDIA (named after W. T. Pritchard, author of "Polynesian Reminiscences"). ORD. *Palmæ.*

Pritchardia—*continued.*

P. macrocarpa (large-fruited). *l.* larger than in *P. Martii*, roundish-flabellate, plicate, divided one-third the way down into numerous linear-lanceolate, acute segments. Sandwich Islands, 1879. This species somewhat resembles *P. Martii*, but is more robust in habit. (I. H. 352.)

P. Martii (Martius'). *l.* dark green, flabelliform, plaited; petioles smooth, unarmed, inclosed at the base in a few rough, brown fibres. Sandwich Islands. A species of recent introduction, quite distinct from *P. pacifica*, and having very small seeds.

P. pacifica (Pacific Islands).* *l.* of a rich dark green, large, flabellate, palmatisect, plaited, covered with white down when young; petioles clothed with a white, scaly tomentum, flat above, rounded below, inclosed at the base in a few coarse, brown fibres, and totally unarmed. *h.* 10ft. Pacific Islands, 1870. A fine species. (F. d. S. 2262-3; I. H. n. s. 161.)

P. pericularum (Dangerous Archipelago).* A handsome, fan-leaved palm, resembling *P. Vuylstekiana*, but differing in having dark brownish-golden petioles, and obliquely spherical fruit. Pomotou Islands, 1883.

P. Vuylstekiana (Vuylsteke's).* *l.* large, deep green, crowded on the young plant, which is short and thick-set. Pomotou Islands of the Dangerous Archipelago. See Fig. 288. (G. C. n. s., xix. 692.)

FIG. 288. PRITCHARDIA VUYLSTEKIANA.

A small genus (about seven species) of very ornamental, stove, unarmed palms, natives of the Friendly and Sandwich Islands. Flowers rather large, hermaphrodite, with a three-parted calyx and corolla, and six stamens; spathe ample, affixed to the peduncle, often silvery-furfuraceous; spadices long-pedunculate, about 3ft. long, with ascending branchlets. Fruit small or rather large, globose or ellipsoid, one-seeded. Leaves terminal, large, often white-furfuraceous, orbicular or cuneate at base, not deeply plicate-multifid; segments narrow, bifid at the apex, and induplicate; petioles concave; sheaths short. The species thrive best in a compost of two parts peat and one of loam and sand. A liberal supply of water is essential. Propagated by seeds only.

P. filifera (thread-bearing). A synonym of *Washingtonia filifera.*

P. Gaudichaudii (Gaudichaud's). *l.* slightly rayed, cuneate at base, the rachis extended near the middle; laciniæ nearly twenty above the middle, bifid at the apex, coriaceous-membranous, lepidoted beneath, about twelve-nerved; petioles totally unarmed. Trunk low. Sandwich Islands.

P. grandis (great). A synonym of *Licuala grandis.*

PRIVA (a name of unknown meaning, given by Adanson). SYNS. *Streptium, Tortula.* ORD. *Verbenaceæ.* A genus comprising about nine species of erect, stove or greenhouse herbs, inhabiting the warmer regions of the globe. Flowers small or mediocre, solitary at the axils of the small, narrow bracts, very shortly pedicellate; calyx ribs five, produced in short teeth, enlarged in fruit; corolla sub-bilabiate, five-lobed; spikes terminal or pedunculate in the axils, long, slender. Leaves opposite, membranous, toothed. Only one species calls for mention here. For culture, *see* **Stachytarpheta.**

P. lævis (smooth). *fl.* remotely opposite or somewhat whorled; corolla reddish, with large, rounded lobes, and a slightly villous throat; raceme terminal. Summer. *l.* ovate-oblong, cuneately attenuated into the petioles, acute or obtuse, deeply mucronate-serrate, paler and opaque beneath, rather thick. Stem erect, 1ft. to 1½ft. high, tetragonal. Argentine Republic, 1833. Greenhouse. (R. G. 1131.)

PRIVET. *See* **Ligustrum vulgare.**

PRIVET, MOCK. *See* **Phillyrea.**

PROBOSCIDEUS. Trumpet-like; proboscis-like.

PROCERUS. Very tall.

PROCESS. A term applied to any projecting appendage, whether natural or monstrous.

PROCESSION FLOWER. *See* **Polygala vulgaris.**

PROCKIA (probably commemorative, but derivation of name not given by nomenclator). SYNS. *Kellettia, Tinea, Trilix.* ORD. *Tiliaceæ.* A genus comprising only two or three species (which are, perhaps, all varieties of the one described below) of stove shrubs, natives of tropical America. Sepals three or four, valvate, persistent; petals sepaloid and persistent, sometimes absent; pedicels fasciculate or shortly racemose, terminal. Leaves ovate, serrated, many-nerved at base. *P. crucis* thrives in a compost of sandy loam and leaf mould. Propagated by cuttings of half-ripened shoots, inserted in sand, under a glass.

P. crucis (Santa Cruz). *fl.* yellow, very fragrant; corymbs few-flowered, terminal. July. *l.* ovate or cordate, acuminated, serrated, with the point entire, membranous. *h.* 5ft. West Indies, &c., 1823. (B. R. 972; L. B. C. 1933.)

PROCLESIA (a name commemorative of Procles, King of Sparta). The correct name of this genus, according to the authors of the "Genera Plantarum," is *Cavendishia.* SYN. *Polybœa.* ORD. *Vacciniaceæ.* A genus comprising about thirty species of handsome, stove, glabrous, evergreen shrubs or small trees, inhabiting the mountains of tropical America. Flowers red, scarlet, white, or flesh-colour, showy, racemose or sub-umbellate, axillary and terminal, pedicellate; calyx tube hemispherical or shortly campanulate, the limb short, dilated, five-lobed or five-toothed; corolla tubular, five-toothed, the teeth valvate; stamens ten. Leaves alternate, persistent, coriaceous, shortly petiolate, entire. The two best-known species are here described. Both are shrubs. For culture, *see* **Thibaudia.**

P. acuminata (taper-pointed).* *fl.* in short racemes, covered, when in bud, by large, scarlet bracts; corolla bright red, with green tips and lobes, ⅜in. long. November. *l.* sub-distichous, on very short, stout petioles, 2in. to 3in. long, ovate or oblong-lanceolate, rounded at base, with long-acuminate or caudate points. Branches pendulous, slightly glabrous or pubescent. Andes of Columbia and Ecuador, 1868. SYN. *Thibaudia acuminata* (B. M. 5752). The correct name of this plant is *Cavendishia acuminata.*

P. cordifolia (heart-shape-leaved). *fl.*, corolla bright red, white at the mouth, tubular-ventricose, nearly 1in. long; racemes reduced to a crowded head. December. *l.* 1½in. to 3in. long, ovate-oblong, obtuse, quite entire, cordate at base; petioles very short, pubescent. Branches terete, pubescent. New Grenada and Ecuador, 1865. SYN. *Thibaudia cordifolia* (B. M. 5559). The correct name of this plant is *Cavendishia cordifolia.*

PROCUMBENT. Lying flat upon the ground.

PROFEREA. Included under *Nephrodium.*

PROIPHYS. A synonym of *Eurycles.*

PROLIFEROUS. *See* **Prolification.**

PROLIFICATION (from *proles*, offspring, and *facio*, I make). A term denoting, in its widest sense, the reproduction of plants by means of buds, as opposed to reproduction by means of seeds. It is accordingly employed to denote the formation in many plants, *e.g.*, the Houseleek (*Sempervivum tectorum*), of offsets or stolons, of which the terminal bud becomes a new plant, and the connection with the parent is severed. It is also employed in cases where buds are formed along the edges of leaves, either on uninjured ones (*e.g.*, *Bryophyllum* and *Malaxis*), or in those that have been injured or cut, as in propagating Begonias from the leaves.

The word is, however, frequently restricted to denote certain alterations that are often met with in the inflorescences and flowers of cultivated plants, in which leaf or flower-buds are produced where they do not

Prolification—*continued.*

naturally occur. If Prolification affects the inflorescence, it consists in the formation of leaf-buds, or of an unusual number of flower-buds. It is often well seen in such plants as Clovers and Plantains, in which the flowers are arranged naturally in a close head or spike. The

FIG. 289. HEN-AND-CHICKENS DAISY, showing Prolification of the Inflorescence.

Hen-and-Chickens Daisy (see Fig. 289), in which the flower-head bears a number of smaller ones around it, is a well-known example of Prolification of the inflorescence. When a single flower is affected, the flower-stalk may be prolonged through and beyond the flower, and may bear leaves or a flower-bud on it. This form of Prolification, known as "median," is occasionally seen in many plants, *e.g.*, the Rose. It is peculiarly frequent in double flowers, *i.e.*, flowers in which the stamens have been replaced by petals. Occasionally, the prolonged flower-stalk bears several leaf-buds or flower-buds. Another form of Prolification, called "axillary," consists in the growth of leaf-buds, or of flower-buds, from the axils of one or more of the parts of a flower. In this form, as in the last, the buds may develop into branches bearing several flowers. Such buds are most frequently situated in the axils of sepals. Next in frequency are those in the axils of leaf-like carpels; less often they are associated with petals; and least common is their occurrence in the axils of stamens. Axillary Prolification is far more frequent in plants in which all parts of the flowers are free, than in those in which they are united; and the flowers most liable to it generally have the top of the flower-stalk, or receptacle, naturally prolonged between the whorls of the flower, or possessed of a glandular disk, or are otherwise peculiar in structure. Those desirous of further information on this subject will find it fully discussed in Dr. Masters' "Vegetable Teratology," published, in 1869, by the Ray Society.

PROMENÆA. Included under **Zygopetalum** (which *see*).

PRONAYA (named in honour of Lad. Pronay, a Hungarian naturalist, who died in 1808). SYNS. *Campylanthera, Spiranthrea* (of Hooker). ORD. *Pittosporeæ.* According to Bentham, in his "Flora Australiensis," this genus is monotypic. The species, *P. elegans*, is an elegant, greenhouse twiner, succeeding in sandy peat. Propagation is effected by cuttings, made of young shooots, and inserted in sand, under a glass.

P. elegans (elegant). *fl.* bluish or white, in a dense, terminal corymb, sessile amongst the last leaves. August. *l.*, lower ones often coarsely toothed or lobed, the others sessile or nearly so, lanceolate or linear-lanceolate, 1in. to 1½in. long, entire, rather firm; margins recurved. Australia, 1857. (P. M. B. xii. 99.) SYNS. *Campylanthera Fraseri, Spiranthera Fraseri.*

PRONE. Lying flat, particularly face downwards.

PROPAGATION. Any method by which plants can be increased in quantity, however slow the process may be, is rightly referred to as being applicable for the purpose of Propagation. Plants are propagated in various ways: some which increase at a most rapid rate by one method cannot be similarly raised by another; occasionally, they cannot be raised at all. The principal modes are those of seeds, cuttings, layers, offsets, bulbs, tubers, suckers, runners, and division of the plant or rootstock. Budding and grafting afford facilities for the rapid Propagation of such plants as under certain conditions may be successfully dealt with; and sometimes leaves are inserted, with the result that new plants or bulbs will eventually form on the firm parts of the main midribs where incisions have been made. Under **Budding, Cuttings, Grafting, Layering,** and **Leaf Propagation,** details may be found of the ways in which these several systems of Propagation are adopted in practice, which it is unnecessary to repeat under this heading.

Propagation by seeds is the most natural mode, and is, consequently, the one by which the vast majority of plants naturally spread and reproduce their species more or less true, according as the flowers are subjected or disposed to become influenced by foreign pollen affecting their fertilisation. If all plants were naturally to reproduce themselves true from seeds, the endless variety represented, for instance, in florists' flowers, could not possibly have been obtained by artificial fertilising and cross-breeding, neither could further improvements be so rapidly made. Where exact counterparts of plants cannot be insured by seed-saving, there is generally some one or more of the other methods of Propagation which can be successfully applied, as the insertion of cuttings, buds, or grafts, which generally retain their distinctive characters, although often—as in budding and grafting—supported by sap which is not that of a plant or tree of the same species, nor, maybe, even of the same genus. The great number of annuals in cultivation must of necessity be propagated from seeds, as their roots do not live long after the seed comes to maturity. The conditions requisite for successful Propagation by seeds, are the proper ripening beforehand of the latter, their right preservation during the interval between collecting and sowing, so as to insure the retention of all germinative properties, and their insertion in soil at the proper time, under conditions favourable to rapid or slow development into plants, as individual sorts may be naturally disposed. Some seeds, even when perfectly matured, retain their germinative properties but a comparatively short time; while others, kept under favourable conditions, are just as good at the end of four, or frequently more, years, as in the first after being gathered. When old seeds of flower or kitchen garden crops are intended for sowing, a few of each should be tested beforehand, in order to ascertain the proportion of good ones in a given quantity. This may easily be done, by sowing a potful, and placing them in a little heat. A seed-room kept at about 45deg., and not much affected by outside fluctuations of temperature, is best suited for the general preservation of seeds, from the time of collecting them until the period for sowing; it should have a boarded floor, and be kept quite dry. There are, however, many seeds, especially those of trees, which lose their vitality if kept dry; these should be placed in sand, soil, damp moss, or some other substance suitable for preserving them, until the proper time for sowing arrives. This varies considerably with different plants, and as those raised from seed are extremely numerous, it is impossible to refer to them in more than limited and very general terms. One of the chief considerations is that of sowing so that the young plants shall appear above ground at a season suitable to their after-development. Tender annuals, that will not withstand cold weather,

Propagation—*continued.*

must be sown in spring; hardy ones sometimes succeed and flower all the better if they are established by that season. Seeds of plants that are biennial—that is, do not flower until the second year—require sowing before, or soon after, midsummer, a season favourable to germination, and one which allows the plants, when obtained, to become established before the winter. There are numerous plants grown from seed for indoor decoration, the season for sowing which depends very much on the time when the product is required. Gardening supplies are in constant demand, and sowing for succession is one of the gardener's chief considerations, as it affects so seriously his system adopted for providing what is requisite at the proper time. There are various methods of seed-sowing, but in the open ground they may practically be reduced to two, namely, scattering indiscriminately or broadcast, and sowing in drills. The last-named is the one now most generally practised, as it affords more convenient opportunities for cleaning and thinning the crops or seedlings, as the case may be, than the broadcast system does. Under glass, shallow pans are perhaps most suitable; they afford a larger top surface than pots, and this is often desirable for enabling one to sow thinly. Whether pans or pots are used, they should always be thoroughly clean and dry, and be well drained. Seeds of any description may be said to require a lighter soil wherein to germinate than that in which the plants will grow when established. Even those of forest-trees, which fall and root themselves into the earth, are naturally provided with a covering of leaf-soil formed by the decay of the leaves which the trees themselves shed. Encouragement to free root action is first essential, and this is usually best given by the use of a light compost, into which the roots can readily enter; any special requirements can be provided when they are stronger, and when nutriment is necessary to assist in building up the plant's tissues. A rule which is sometimes adopted, and which is not altogether to be considered inapplicable at any time, is that of covering seeds, when sowing, with an amount of soil about equal to their own depth. If the seeds were very small, and covered deep with soil, in all probability, the plants would perish before reaching the surface; large seeds, which are generally of a much stronger constitution, are more likely to succeed. It is, however, noticeable that some large trees have comparatively minute seeds, which require very careful treatment when young specimens are being raised.

Passing on to refer briefly to the other methods of Propagation enumerated, cuttings are perhaps the most useful. Nearly all soft-wooded plants are readily increased by them, and a very large proportion of hard-wooded ones that are not entirely limited to being increased from seeds. Cuttings require to be of different degrees of firmness. A proper knowledge of various plants must be acquired from experience before successful propagating can be practised. Some cuttings emit roots from almost any part of the stem, while others need a joint or heel, and preparation of an exact nature, to insure the emission of roots. Offsets, tubers, bulbs, and corms, are formed, in some cases, on the stems of plants which bear them, but more generally about their roots. Where they are produced, an easy mode of Propagation is effected by separating or lifting them when the old plants ripen and their tops decay. Tubers admit of being cut into several pieces, each of which will eventually form another plant if it is provided with a perfect eye or bud that can be preserved from injury after being planted; the Potato is a well-known example of this. Corms of the Crocus will also be familiar; they are formed in quantity round the old one, and should be taken up and replanted separately each year. Propagation from suckers is a simple pro-

Propagation—*continued.*

ceeding; it consists in taking up the sucker, with all its roots, and replanting it at any time when the parent plant or tree may also be safely removed. Suckers are not always to be favoured; they are inclined to similarly reproduce themselves, and rob sap which should proceed to the one main stem. Such things as Filberts, Lilacs, Raspberries, &c., may, however, be propagated from suckers; and for an example of plants in pots which may be similarly increased, Chrysanthemums may be cited. Runners proceed along the ground, and form small plants, which are first nourished by the parent, but afterwards root and support themselves. Varieties of Strawberries are almost exclusively propagated by runners, and there are several other examples. Propagation by division is generally understood to mean the parting of the rootstock of a plant and inserting the pieces thus obtained with roots, to form separate plants. It is a very important method, often available when many of the others are impracticable, or employed with difficulty or uncertainty.

PROPAGINES. Bulblets formed on the stems of some plants.

PROPENDENT. Hanging forwards and downwards.

PROPHYLLA. Primary leaves.

PROSAPTIA. Included under **Davallia** (which *see*).

PROSARTES. Included under **Disporum** (which *see*).

PROSELIA. Included under *Chætanthera.*

PROSERPINACA (an old Latin name, used by Pliny, probably from *proserpo*, to creep; in reference to the creeping stems). Mermaid Weed. SYN. *Trixis.* ORD. *Haloragecæ.* A genus comprising a couple of species of hardy, aquatic herbs, inhabiting North America and the West Indies. Flowers minute, axillary, sessile, solitary or clustered. Leaves alternate, sub-sessile, lanceolate, dentate or pectinate-pinnatifid. Stems creeping at the base. The species should be grown in large pans of water, with a little soil for the roots to run in; or they may be cultivated in ponds. They require shelter during winter.

P. palustris (marsh-loving). *fl.* white. Summer. *l.* lanceolate, sharply serrate, the lower pectinate when under water. Canada, &c., 1818.

P. pectinacea (pectinate). *fl.* white. Summer. *l.* all pectinate, the division linear-awl-shaped. North America, &c., 1821.

PROSOPIS (an old Greek name used by Dioscorides for the Butter-bur). Including *Algarobia.* ORD. *Leguminosæ.* This genus comprises about eighteen species of trees or shrubs, often armed with hooked prickles or stout, axillary spines, or with both, dispersed through the tropical and sub-tropical regions. Flowers small, in cylindrical spikes, or rarely in globose heads; calyx campanulate, shortly dentate; petals valvate. Leaves bipinnate, generally rigid, and of a glaucous hue, with only one or two pairs of pinnæ, but with a considerable number of leaflets. The species are very rarely seen in cultivation, with the exception of *P. siliquastrum*, a nearly hardy tree, which thrives in sandy loam. Propagation is effected by rather firm young shoots, taken off close to the older stems, and inserted in sand, under a glass, in gentle heat.

P. siliquastrum (Siliqua-podded). *fl.* white. *l.* with two or three pairs of pinnæ, each pinna having numerous pairs of linear, obtuse leaflets. Spines stipular, twin, straight. *h.* 30ft. to 40ft. Chili, 1827.

PROSTANTHERA (from *prostithemi*, to append, and *anthera*, an anther; alluding to the connectives of the anthers being spurred beneath). Australian Mint-bush or Mint-tree. Including *Chilodia.* ORD. *Labiatæ.*

Prostanthera—*continued.*

An Australian genus comprising thirty-eight species of greenhouse shrubs or under-shrubs, studded with resinous glands, and usually strongly scented. Flowers generally white or red, shortly stalked, with a pair of bracteoles close under the calyx; calyx campanulate, the limb of two broad, entire lips; corolla tube short, dilated into a broad, campanulate throat, the upper lip of the limb broadly two-lobed, the lower three-lobed; whorls two-flowered, axillary or disposed in a terminal raceme. Nutlets ovoid, reticulately wrinkled. Leaves entire or toothed, often rather small, the upper ones conformed or reduced to deciduous bracts. The species best known, and most worth growing, are the under-mentioned. They are all shrubs. A sandy-peat soil suits them best. Plenty of drainage is at all times essential. Propagated by cuttings of the young shoots.

P. cuneata (wedge-leaved). *fl.* all axillary, but sometimes crowded into terminal, leafy racemes; corolla white, with purple spots, twice as long as the calyx. June. *l.* sessile or nearly so, often crowded on the short branchlets, obovate-cuneate or almost orbicular, obtuse, entire or crenate, the margins often slightly revolute. *h.* 2ft.

P. empetrifolia (Empetrum-leaved). *fl.* axillary; corolla violet, fully twice as long as the calyx. September. *l.* sessile, linear, acute, entire, with revolute margins, rarely above ¼in. long. *h.* 2ft. 1829. (B. M. 3405, under name of *Chilodia scutellarioides.*)

P. lasianthos (woolly-flowered). Victorian Dogwood. *fl.* white, tinged with red, hairy, opposite, in pairs; throat of corolla spotted with red inside; pedicels short; racemes panicled. June. *l.* petiolate, usually oblong-lanceolate, rather acute, dentately serrated, 2in. to 3in. long. Branches nearly glabrous. *h.* 3ft. to 6ft. 1808. This species proves nearly hardy in favoured spots, and when grown against a wall. (A. B. R. 641; B. M. 2434; B. R. 143.)

P. nivea (snowy).* *fl.* snow-white, or tinged with pale blue, rather large, axillary, the upper ones forming terminal, leafy racemes; corolla twice as long as the calyx. *l.* sessile, linear-terete, with incurved or involute margins, or flat when fresh, acute or obtuse, rather slender, mostly ¼in. to 1in. long, the upper floral ones smaller. *h.* 3ft. to 6ft. 1866. A beautiful species. (B. M. 5658.)

P. rotundifolia (round-leaved). *fl.* purple, in short, close, terminal racemes, the lower ones sometimes in the axils of the leaves, like the stem ones. July. *l.* broadly ovate-orbicular or spathulate, on rather long petioles, very obtuse, entire or slightly crenulate, all less than ½in., and sometimes under ¼in., long. *h.* 3ft. 1824.

P. violacea (violet).* *fl.* usually bluish-purple, in two or three pairs, forming small, terminal, compact racemes; corolla not twice as long as the calyx, and sometimes scarcely exceeding it. June. *l.* very small, shortly but distinctly petiolate, broadly ovate or orbicular, more or less crenate, with revolute margins, rarely exceeding two lines, and often not more than one line, long. *h.* 4ft. 1820. (B. R. 1072.)

PROTANDROUS. *See* **Proterandrous.**

PROTEA (from *Proteus*, the versatile sea-god; in allusion to the diversity of the species). SYNS. *Erodendron, Leucadendron* (of Linnæus), *Pleuranthe.* ORD. *Proteaceæ.* A genus comprising about sixty species of magnificent, greenhouse shrubs or small trees, almost all natives of extra-tropical South Africa, one or two extending in tropical Africa as far as Abyssinia. Flowers solitary, densely capitate, surrounded sometimes by coloured bracts; heads usually large, globose or rarely oblong, cone-like; receptacle thick, flat or convex; involucral scales numerous, imbricated, or the lower ones sometimes elongated, blackish or coloured. Leaves alternate or scattered, coriaceous, rigid, entire, very variable in shape. Many of the species have been introduced to cultivation, but are now only rarely met with. They require an airy greenhouse, with exposure to full sunlight; during summer, they should be placed out of doors. Most of them thrive only in well-drained, sandy peat, and they are induced to flower freely by allowing them to become pot-bound after they have grown to the required size. Some form large shrubs, and flower on the ends of the branches; while others are dwarf and trailing, and the flowers are produced on the old stem, close to the ground. Propagated by cuttings of the half-ripened young wood, inserted in sandy peat, under a bell-

Protea—*continued.*

glass; or by imported seeds. Several of the species formerly included here will now be found under **Serruria** (which *see*).

P. acaulis (stemless). *fl.* purple, in a sessile, hemispherical head, 1in. to 1½in. in diameter. July. *l.* obovate-oblong, thick, 4in. to 8in. long, 1in. to 2in. broad, obtuse or mucronate-acute, narrow-cuneate below the middle, sometimes petioliform at base. Stem shortened and much branched, depressed. *h.* 1½ft. 1802. (B. M. 2065.)

P. acerosa (acerose). *fl.* blackish, in somewhat aggregate, subsessile, turbinate-hemispherical heads, 1in. in diameter; perianth scarcely ⅜in. long. April. *l.* subulate, slender, somewhat rigid, smooth, seven to twelve lines long, scarcely half a line broad. Stems erect, nearly 1ft. high, sub-umbellately branched. 1803. This species may be readily recognised by the leaves being more slender than the style. (B. R. 351.)

P. angustifolia (narrow-leaved). A form of *P. grandiflora.*

P. cordata (heart-shaped).* *fl.* purple, in a hemispherical head as large as a small apple; scales red, obtuse; perianth ½in. long. April. *l.* remote, glaucous, sessile, cordate, and somewhat rounded or ovate, rigid, 2in. to 4in. long, 1½in. to 5in. broad; young ones red-margined. Stem prostrate, short, scaly; branches slender, ascendent. *h.* 3in. to 12in. 1790. (A. B. R. 289.) SYN. *P. cordifolia* (B. M. 649).

P. cordifolia (heart-shape leaved). A synonym of *P. cordata.*

P. coronata (crowned). A synonym of *P. formosa.*

P. cynaroides glabrata (Cynara-like, glabrous).* *fl.* white, greenish within, in large, obovate-globose, at length spreading heads; scales rosy-tipped. August. *l.* elliptic or oval-oblong, attenuated at both ends, usually obtuse. Stems epigæous, 6in. to 12in. long, very simple, thick. 1774. (A. B. R. 288, under name of *P. cynaroides.*)

P. c. obtusifolia (obtuse-leaved). *fl.* like those of the type. *l.* sub-orbicular or obovate, very obtuse, shortly attenuated at base or sub-emarginate, together with the petiole 4in. to 6in. long, 1in. to 2in. broad. (B. M. 770, under name of *P. cynaroides.*)

P. formosa (beautiful).* *fl.*, perianth violet; involucre of an intense rose-colour, the scales white-ciliated. May. *l.* narrow-oblong, oblique, glaucescent, 3in. to 4in. long, 1½in. to 2in. broad, slightly obtuse, rose-margined, glabrous. Branches, as well as the margins of the leaves, tomentose. *h.* 6ft. 1789. (B. M. 1713.) SYN. *P. coronata* (A. B. R. 469).

P. formosa (beautiful), of Andrews. A synonym of *Leucospermum medium.*

P. grandiflora (large-flowered). *fl.* white, in heads as large as a man's fist; calyx ¾in. long; style at length 3in. long, straight; young scales ferruginous- or white-tomentose. May. *l.* oblong, obtuse, reticulate-veined, not marginate, 3in. to 5in. long, from 1in. to 2in. broad, coriaceous, with a terminal, obtuse or sub-recurved callus. Branches glabrous, densely leafy. *h.* 6ft. to 7ft. 1787. A small tree. (B. M. 2447.) *P. angustifolia* (B. R. 569), according to Meissner, is a mere form of this, with lanceolate leaves, six to eight lines broad.

P. lævis (smooth). *fl.* greenish, nearly 1in. long, in sessile, mediocre, erect, hemispherical heads; scales sub-sericeous, at length glabrous. May. *l.* glaucous, elongated-linear, acute, glabrous, attenuated at base, flat, secund, 4in. to 6in. long. Stem decumbent, dwarf. 1806. (B. M. 2439.)

P. latifolia (broad-leaved). *fl.* purple, scarlet, or green, as much as 3½in. long, tomentose, in large, turbinate heads. August. *l.* sessile, cordate-ovate, obtuse, reticulate-nerved, 3in. to 4in. long, 2in. to 3in. broad, thick, amplexicaul, the margins sometimes woolly. Branches tomentose, densely leafy at apex. *h.* 6ft. to 8ft. 1806. (B. M. 1717.) SYN. *P. radiata* (A. B. R. 646).

P. lepidocarpon (scaly-fruited). *fl.* purple, in ovoid, sessile heads, about the size of the fist; perianth nearly 2in. long, pilose. May. *l.* lanceolate, acute, narrow at base, slightly scabrous-dotted, rigid, erect, 3in. to 5in. long, five to seven lines broad. Branches glabrous, or the younger ones tomentose or sub-villous. *h.* 6ft. 1806. Shrub or small tree. (A. B. R. 301, under name of *P. grandiflora* var.)

P. lepidocarpon (scaly-fruited), of Ker. A synonym of *P. melaleuca.*

P. longifolia (long-leaved). *fl.* pale, blackish at the tips of the perianth, 4in. long, pilose, in large, ovate-oblong heads, very shortly turbinate at base. February. *l.* narrow-lanceolate, long-attenuated, 3in. to 6in. long, three to four lines broad, acute or obtuse, or callous-apiculate. *h.* 2ft. 1798. (A. B. R. 132-134; B. R. 47.)

P. magnifica (magnificent). A synonym of *P. speciosa.*

P. melaleuca (black-and-white). *fl.*, involucral scales white-ciliated, outer ones squarrose, inner ones connivent, black-tomentose at back. May. *l.* linear-ligulate, ciliated on the margins. Branches slightly pilose. *h.* 6ft. 1786. SYNS. *P. lepidocarpon* (B. M. 674), *P. speciosa nigra* (A. B. R. 103).

P. mellifera (honey-bearing).* Cape Honey-flower, or Sugar-bush. *fl.* pink or white, 3in. to 3½in. long, white-penicillate at the tips, in large, ovate-oblong, attenuated, sub-pedunculate heads, 3in. to 4in. long; scales of a beautiful sanguinary-rose colour, slenderly striated. September. *l.* lanceolate, of a pleasing green, 3in. to 5in. long, three to six lines broad, by no means marginate, slightly callous-apiculate. Branches spreading, ascendent at apex. *h.* 6ft. 1774. Shrub or small tree. (A. B. R. 582; B. M. 346.)

P. mucronifolia (mucronate-leaved). *fl.* violet, white within, and white-bearded, less than 1in. long, in small, globose, subsessile heads, about the size of a walnut. September. *l.* linear, 1½in. to 2in. long, with a pungent mucrone, not narrowed at the base. Branches glabrous. *h.* 4ft. 1803. (A. B. R. 500; B. M. 933.)

P. neriifolia (Oleander-leaved). *fl.* purplish and yellowish-white, plumose at the tips, in oblong-turbinate heads, 3in. long; inner scales silvery-silky, black-bearded on the margins. March. *l.* linear-lingulate, 4in. or more long, about ¾in. broad, obtuse or very slightly acuminate, emarginate at base, and, as well as the branches, tomentose. *h.* 3ft. or more. 1806. A robust shrub. (B. R. 208.)

P. penicillata (pencilled). *fl.* 1½in. to 1¾in. long, white-bearded at the apex, in a turbinate, spheroid head, as large as an apple; style 2½in. long, sulcate. Summer. *l.* lanceolate, slightly obtuse at both ends, 2in. to 3in. long, six to ten lines broad, the young ones villous-ciliated. Branches slender, rather loosely leafy, tomentose at the top. Shrub. (B. M. 6558.)

P. pulchella (pretty).* *fl.* red; inner involucral scales silky, black-bearded on the margins. June. *l.* linear-lingulate, rather blackish on the margins, slightly scabrous. *h.* 3ft. 1795. (A. B. R. 270; B. R. 20.)

P. radiata (rayed). A synonym of *P. latifolia.*

P. Scolymus (Scolymus).* *fl.* purple, ½in. to ¾in. long, in sessile, erect heads, as large as a plum, at length obovate; style 1in. long, rather thick. April. *l.* linear-lanceolate, acute, long-attenuated at base, 2in. to 4in. long, ¼in. to ½in. broad, striate-wrinkled, and, as well as the branches, glabrous. Branchlets slender, corymbose, rather loosely leafy. *h.* 3ft. 1780. An erect shrub. (A. B. R. 409; B. M. 698.)

P. speciosa (showy). *fl.* 3in. long, white-silky, the laminæ sometimes red- or white-bearded; heads ovoid, as large as the fist; scales all white-silky. April. *l.* thick, oblong or obovate, narrowed at base, somewhat acutely mucronate, 3in. to 6in. long, 1in. to 2in. broad, and, as well as the erect branches, glabrous. *h.* 6ft. 1786. Shrub or small tree. (A. B. R. 110; B. M. 1183.) SYN. *P. magnifica* (A. B. R. 438).

P. s. nigra (black). A synonym of *P. melaleuca.*

P. villifera (villi-bearing). *fl.* purple, in sessile, oblong heads, 3in. long and 1in. to 2in. broad; inner scales pink, white-bearded at apex. August. *l.* sessile, glaucous, obovate-oblong, obtuse, attenuated at base, 3in. long, 1in. to 2in. broad, and, together with the branches, pilose. *h.* 6ft. 1800. (B. R. 1023.)

PROTEACEÆ. A natural order of trees or shrubs, rarely perennial herbs, mostly Australian or South African, a few being dispersed in tropical or extra-tropical South America and the South Pacific Islands; they are wholly wanting in North temperate regions. Flowers hermaphrodite, or by abortion polygamous or dicœcious, capitate-spicate, racemose, or rarely solitary, bracteate, very rarely bibracteolate; perianth inferior, of four at first valvate, coherent segments, afterwards becoming more or less recurved; stamens four, always shorter than the perianth; anthers erect, in hermaphrodite flowers all perfect or rarely one abortive, the connective continuous with the filaments; bracts sometimes small, very caducous, or almost obsolete, sometimes imbricating and persistent, forming a hard cone. Fruit very variable in form. Leaves alternate or scattered, rarely opposite or whorled, entire, much toothed, or sometimes pinnatisect or decompound on the same plant, usually coriaceous; stipules none. Many of the species are well known to gardeners, by whom they have long been cultivated. Several produce an abundance of nectar. The wood of some of the Australian kinds is valuable for cabinet-making. *Proteaceæ* comprises forty-nine genera and about 950 species. Well-known examples are: *Banksia*, *Grevillea*, *Hakea*, *Leucospermum*, and *Protea.*

PROTEINOPHALLUS. Included under *Amorphophallus.*

PROTERANDROUS and **PROTANDROUS** (from the Greek words *proteros*, sooner, and *aner*, *andros*, a male). Words devised, by Delpino and by Hildebrand respectively, to signify that, in a flower which possesses both stamens and pistil, the pollen is

Proterandrous and **Protandrous**—*continued.*

ripe before the stigma of the flower is ready to receive it. This is one of the most frequent adaptations to favour cross-fertilisation in plants, since the pollen of a Proterandrous flower is frequently removed by wind or insects before the stigma is ready for its reception; hence, pollen must be brought to the stigma from a younger flower.

PROTEROGYNOUS and **PROTOGYNOUS** (from *proteros*, sooner, and *gyne*, a female). Terms used, by Delpino and by Hildebrand respectively, to denote a hermaphrodite flower in which the stigma is ready to receive pollen before that in the same flower is ripe. In Proterogynous flowers, the stigma is pollinated from an older flower, and may be withered, or may have fallen off, before the anthers in its own flower have burst to shed the pollen. Proterogyny is not frequent. The common Pellitory (*Parietaria officinalis*) affords an example.

PROTHALLUS, or **PROTHALLIUM** (from the Greek words *pro*, instead of, and *thallos*, a branch; in reference to the structure thus named taking the place of a stem). The body which is developed from a spore of a Fern, Horsetail, Club-moss, or Pillwort. It varies much, in these four groups, in its degree of development, and in its form; but, in all cases, it is entirely cellular throughout its existence, and on it are formed the organs for sexual reproduction. In Ferns, the male and the female organs are present in the same Prothallus; in most plants of the other groups, the Prothallus bears only male or only female organs. There is a distinct alternation of generations in plants that produce a Prothallus, *i.e.*, in the higher Cryptogams. The spore pro-

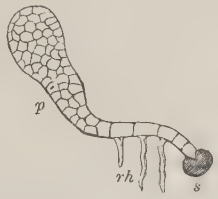


FIG. 290. YOUNG PROTHALLUS, much enlarged—*p*, Prothallus; *rh*, Root-hairs of Prothallus; *s*, Spore.

duces the Prothallus (see Fig. 290), on which are formed the sexual organs, the male being the antheridia, with antherozoa, and the female being the archegonia, in each of which lies the oosphere, which, fertilised by antherozoa, becomes the oospore. This develops into the Fern-plant bearing the well-known fronds, on the back of which are visible the groups (sori) of minute, brown spore-cases (sporangia), in which lie numerous spores, like the one with which the cycle began. The

FIG. 291. LOWER SURFACE OF MATURE PROTHALLUS, much magnified—*a*, Archegonia; *rh*, Root-hairs.

spores are formed by vegetative growth, not by sexual reproduction. It will thus be seen that the Prothallus and the leafy Fern-plant are two generations in the course of a single cycle. The Prothallus of Ferns (except in the Moonwort group) is a flattened, green, expanded body, which grows in damp places, *e.g.*, on damp bricks. It is thin, and consists of a single layer

Prothallus, or **Prothallium**—*continued.*

of cells, except in the middle, where it reaches a thickness of several layers. The cells contain an abundant supply of chlorophyll bodies, which give the Prothallus its colour. In general outline, the Prothallus, when full-grown, usually resembles the conventional figure of a heart, having one end narrowed, and a notch in the broader margin (see Fig. 291). It seldom exceeds ¼in. in breadth. On the lower surface are numerous root-hairs, each made up of a row of cells. On the lower surface also, and along the edges, are formed the antheridia. The archegonia are situated in the middle of the lower surface. The antheridia originate as outgrowths of cells of the epidermis; each outgrowth is cut off, as a new cell, by a cell wall. In some Prothalli, the contents of the cell thus formed break up into a number of small, rounded cells, called "parent cells." In each of these there is formed an antherozoid, slender, but coiled spirally in two or three turns, and provided

FIG. 292. ANTHEROZOID, much magnified.

with a tuft of fine hairs, or cilia, at one end (see Fig. 292). In most Prothalli, however, a process of cell-division goes on in the young antheridium, whereby it is finally made up of a layer of cells surrounding

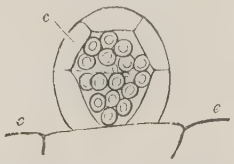


FIG. 293. YOUNG ANTHERIDIUM, much magnified—*c*, Central Cell, filled with Parent Cells of Antherozoids; *e*, *e*, Epidermis of Prothallus.

a central cell (see Fig. 293), and, in this latter, the parent cells are developed, and produce antherozoids. The outer coat, formed by the layer of cells, has to aid in expelling the antherozoids when ripe, and the cells do this by absorbing water rapidly, swelling, and compressing the contents of the central cell till its apex,

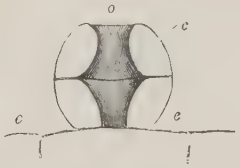


FIG. 294. RIPE ANTHERIDIUM (much magnified), from which Antherozoids have been shed by opening at *o*—*c*, Empty Central Cell; *e*, *e*, Epidermis.

which is not covered by the layer, is burst (see Fig. 294), and the "parent cells" are expelled, and, soon rupturing, set free the antherozoids. The latter move about actively in water, *e.g.*, in a drop of dew or of rain.

The archegonia are situated on the lower surface, behind the notch already mentioned (see Fig. 291). Each originates, like the antheridia, from a cell of the epidermis, from which it grows out, in a hemispherical form. A cell wall forms, and cuts it off from the cell of the epidermis. It increases in size, and becomes further divided into three layers; and these are again

Prothallus, or **Prothallium**—*continued.*

sub-divided by cell walls. The result is that a structure is formed in the shape of a flask with a long, narrow neck. The hollow of the flask is occupied by a large

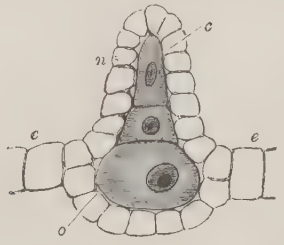


FIG. 295. IMMATURE ARCHEGONIUM, much magnified, —*n*, Neck-cells; *c*, Canal, still closed above, and filled by the Canal-cell; *o*, Oosphere; *e*, *e*, Epidermis of Prothallus.

cell, the oosphere, rich in protoplasm (see Fig. 295). The tube of the neck is at first filled with a narrow cell, the canal-cell, the cell wall of which becomes mucilaginous, swells, and is expelled from the outer opening of the tube, leaving a passage for the antherozoid down the tube to the oosphere, when the latter is ripe to be

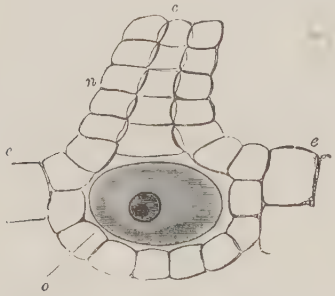


FIG. 296. LONGITUDINAL SECTION OF MATURE ARCHEGONIUM OF FERN, much magnified—*n*, Neck-cells; *c*, Opening of Canal down neck; *o*, Oosphere; *e*, *e*, Epidermis of Prothallus.

acted on by it (see Fig. 296). The antherozoids are caught in the mucilage while moving over the moist Prothallus; they wriggle down the tube, reach the oosphere, and fertilise it. The latter very soon begins to grow; and the final result is the development of the oospore into the leafy plant or Fern. It may be mentioned that the

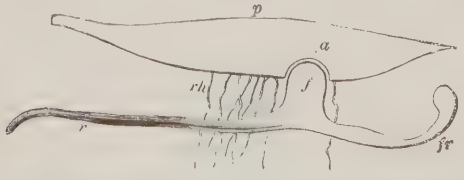


FIG. 297. DIAGRAMMATIC SKETCH OF CONNECTION OF YOUNG FERN WITH PROTHALLUS—*p*, Prothallus; *rh*, Root-hairs of Prothallus; *f*, Foot of Young Fern, imbedded in hollow of enlarged Archegonium, *a*; *fr*, Very Young Frond of Fern; *r*, Root of Fern.

oospore, at a very early period, divides into eight cells, in two layers. Of these cells, four lie next the base, and four next the front margin of the Prothallus. Of the latter, the two farthest from the neck of the archegonium give origin to the first leaf or frond; one, near the neck, to the growing point of the stem; and the fourth to hairs. Of the other four cells, one, opposite to the stem, develops into the root, one ultimately disappears, and the other two form the "foot," a structure that remains sunk in the archegonium, which has grown so as still to surround the foot (see Figs. 297 and 298). By means of this

Prothallus, or **Prothallium**—*continued.*

organ, the young plant absorbs nourishment from the Prothallus, which, for a time, increases in size, but is gradually used up, and withers away, and afterwards the young Fern is able to nourish itself by its own roots and leaves.

FIG. 298. YOUNG FERN GROWING FROM PROTHALLUS, slightly enlarged—*p*, Lower Surface of Prothallus; *rh*, Root-hairs of Prothallus; *fr*, Young Frond of Fern; *r*, Root of Fern.

Two departures from this mode of reproduction have been detected in Ferns within recent years. The one of these, called "apogamy" (from *apo*, afar, and *gamos*, marriage) by Professor de Bary, was detected, in *Pteris cretica*, by Professor Farlow, and is now known to occur in a few other Ferns, including *Nephrodium Filix-mas cristatum*. In this process, the young Fern is produced as a bud from certain parts of the Prothallus, without the formation of sexual organs. The sexual process in this case is abolished, as the name indicates.

In 1884, Mr. Druery stated, in the Linnæan Society, the discovery that, in certain Ferns, the Prothalli are produced as outgrowths from the pinnules of the Fern fronds, and not from the spores. This process has been called "apospory" (from *apo*, afar, and *spora*, a spore or seed). It has been investigated and described by Professor Bower in examples supplied by Mr. Druery, of *Athyrium Filix-fœmina clarissima*, and *Polystichum angulare pulcherrimum*. In this departure, the production of spores is suppressed; the Prothalli in the former being modified sporangia, while, in the latter Fern, no trace of the sporangium even can be detected. The sexual reproduction is not affected, and the leafy Ferns are developed from the Prothalli in the usual way.

Though of very great scientific interest, the development of Prothalli, and of the sexual organs on them, is of less practical importance to gardeners in the other groups of Vascular Cryptogams than it is in the true Ferns; but an outline of the chief points of difference in these groups may be given. In the small group *Ophioglosseæ*, represented in the British Flora by the Moonwort and Adder's Tongue Ferns, the Prothallus is formed underground, is destitute of chlorophyll, and is usually formed of a mass of cells. It produces sexual organs, which resemble those of Ferns in the main. The *Equisetineæ*, or Horsetails, resemble Ferns in the Prothalli being green, flattened layers of cells, growing on damp surfaces; but they become branched into long, narrow lobes, and may reach ½in. in length. They are dicœcious, *i.e.*, each produces only antheridia or archegonia. The former are produced near the tips of the lobes of the male Prothalli; the latter usually in the clefts between the fleshy lobes of the female Prothalli. The development of the sexual organs, and of the "leafy plant" (if an Equisetum deserves this designation), calls for no special comment here, as it agrees in the main points with that in Ferns.

The Club-mosses fall into two groups, of which one, the *Lycopodieæ*, much require to have their development worked out. So far as is known, their Prothalli are irregularly-lobed masses of cellular tissue, and bear both

Prothallus, or Prothallium—*continued.*

antheridia and archegonia; and the young, leafy plant continues to draw nourishment from it for a time, as in Ferns. There is only one form of spores in this group, and the Prothalli are, therefore, all alike in each species. The second group, *Selaginelleæ*, is largely cultivated in greenhouses, and the cycle of development has been fully studied. In this group, spores of two kinds are produced in sporangia, in the axils of the leaves, near the tips of branches of the leafy plants. The two kinds are the microspores and the macrospores, which produce male and female Prothalli respectively. The microspores (from *mikros*, small, and *spora*, a spore) are much smaller than the macrospores (from *makros*, large, and *spora*). The Prothalli developed from both are very much reduced in size, as compared with the Prothalli already described; indeed, the greater part, or even the whole, of their development, goes on *inside the spores*. The peculiarities of development of these Prothalli have been very carefully investigated, and described in detail, by Millardet, and by Pfeffer. The male Prothallus is developed entirely in the interior of the microspore. In this, a small part (the vegetative cell) is first cut off, and the remaining contents are divided by cell walls into six or eight cells, and these (or only certain of them in some species) divide still further to form the parent cells of the antherozoids. In each of these, a long, slender, spiral antherozoid, with cilia at one end, is produced. The macrospores, while still in the sporangium, in *Selaginella*, show a mass of small-celled tissue, like a cap, at one end, covering a very large cell, which occupies the greater part of the spore. After the spore has been for some time out of the sporangium, this large cell becomes filled with a mass of cells of comparatively large size, individually, which Pfeffer regards as analogous to the endosperm in the seeds of angiosperm flowering plants. The cap above this mass is the Prothallus, and this increases in size, and archegonia form in it, beginning at the apex, and gradually forming at a greater distance from the apex. The coats of the spore burst above the Prothallus, which projects a little. The structure of the archegonium and of the oosphere, and the mode of fertilisation, are similar, in the important points, to those above described as occurring in Ferns; and so, moreover, is the development of the leafy plant. In the nearly allied genus *Isœtes* the development is much like that in *Selaginella*, but no endosperm is formed in the macrospore. The *Rhizocarpeæ* agree, to a considerable extent, with the *Selaginelleæ*.

The great interest of the Prothallus in *Selaginelleæ* and the allied forms rests in the light the study of it throws on the processes of reproduction in Phanerogams (*see* **Ovule** and **Pollen**). The homologous stages, or what are at present regarded as such, may be briefly stated as follows. In Phanerogams, the pollen grains represent the microspores, and the multicellular nature of the pollen corresponds to the multicellular microspore of *Selaginella*, with its rudimentary Prothallus represented by the vegetative cell. The Gymnosperms and the Angiosperms differ as regards the ovule. In Gymnosperms, the temporary endosperm is regarded as representing the Prothallus inclosed in the embryo-sac as its macrospore; the corpuscula represent archegonia, the rosette cells represent the neck of the archegonium, and the central cell of the corpusculum represents the oosphere. As already stated, the large-celled tissue in the macrospore of *Selaginella* is regarded by Pfeffer and Sachs as representing the endosperm that develops in seeds after fertilisation. In Angiosperms, the embryo-sac represents the macrospore, the antipodal cells, perhaps, correspond to the Prothallus, the embryonal vesicle to the oosphere, the helper-cells to the neck of the archegonium, and the endosperm has the significance already stated.

PROTOGYNOUS. *See* **Proterogynous.**

PROTOPLASM (from *proton*, first, and *plasma*, formed matter). A word frequently used by students of the microscopic structure of plants and of animals. The term was first proposed, in 1846, by the distinguished German botanist, Hugo von Mohl, and is still used in the sense employed by him, to denote the transparent, soft, semi-fluid, jelly-like substance found in young, living cells of all plants. He was the first to appreciate the true importance of this substance. Before his observations were made, it had been very generally believed that the wall which bounds each cell, and remains very evident after the cell contents have been emptied out, was the essential part of the cell; and the name "cell" was given to the space inclosed by the cell wall. It seems to have been first used, in 1665, by the English microscopist, Robert Hooke, who says: "Our microscope informs us that the substance of cork is altogether filled with air, and that that air is perfectly inclosed in little boxes or cells, distinct from one another." Von Mohl recognised that the really essential part of the cell is the Protoplasm; and that by it other cell contents and the cell wall are produced. This view has been fully confirmed by later investigations, and also by the fact that among Ferns, Mosses, and other flowerless plants, the essential reproductive cells, for a time, consist of Protoplasm alone, without a cell wall.

In young, growing tissues, such as the tip of the root of a Bean, or of any other large seedling, the Protoplasm at first frequently fills the space bounded by the cell wall. At one place lies a denser, round or oval mass, also composed of Protoplasm, called the "nucleus," with a clearly-defined edge. As the cell grows larger, the Protoplasm does not increase so much as to fill the space within the cell wall. Cavities appear in it, occupied by fluid or cell sap. These are, at first, separated by plates of Protoplasm; but, with continued increase in size of the cell, the vacuoles unite, and form one large cavity in the centre, occupied by cell sap; and the Protoplasm forms only a layer lining the cell wall.

When a living cell is laid in strong glycerine or in alcohol, the water of the cell sap and of the Protoplasm is drawn out of the cell by these fluids, and the contents shrink away from the cell wall, leaving an empty space between them and the wall all round. The outer surface of the shrunken mass is clearer and less granular than the rest, and looks almost like a distinct coat. It was formerly known as the "primordial utricle," but is now more usually called "ectoplasm" (from *ektos*, outside, and *plasma*). The inner substance, called "endoplasm" (from *endon*, inside, and *plasma*), is more granular, and incloses starch grains and other bodies connected with the nourishment of the tissues of the plants.

Living Protoplasm is constantly undergoing rapid changes of composition, taking into it new food, forming new bodies or products, and getting rid of materials that have done their work, and must be thrown out. All this implies constant changes in the position of the minute particles of which Protoplasm consists, though these movements are too slow, and the particles are usually too small, to permit of their being followed under the microscope. But in many cells (probably in most) the Protoplasm is seen to be moving round and round the cell, if it forms only a layer lining the cell wall; or it may be seen to move along the slender plates between the vacuoles, from the outer layer inwards towards the layer around the nucleus, and again outwards. Often a thin thread or plate shows two streams on its sides moving in reverse directions. Cells that consist of Protoplasm without a cell wall, are usually able to move freely about in water by moving fine threads or cilia, or by pushing out pseudopodia, or outgrowths, from the surface, and flowing towards these, *e.g.*, in some stages of *Myxomycetes*, such as Flowers of Tan, and other Fungi closely related to it.

Protoplasm—*continued.*

The chemical composition of Protoplasm is very complex. It belongs to the group of substances similar in nature to white of egg, or albumen. It is very similar in its properties in plants and in animals, in which latter it has been called "sarcode" (from *sarx*, flesh). When laid in a solution of iodine, it becomes yellowish or pale yellowish-brown. Dyes, such as magenta, eosin, and other aniline colours, carmine, logwood, &c., very generally colour dead Protoplasm readily, especially the nucleus; but the living substance resists their action. A dilute solution of caustic potash dissolves Protoplasm, and is therefore often used, in microscopical work, to clear it out of sections where the chief desire of the operator is to see the arrangement of the cell walls only. Other tests for distinguishing Protoplasm are also occasionally used; but for these, inquirers are referred to such works as Sachs' "Textbook of Botany," Henfrey's "Elementary Course of Botany," Bower and Vine's "Practical Botany," or other works dealing technically with the subject.

PROUSTIA (named after Proust, a Spanish chemist, who died in 1826). ORD. *Compositæ*. A genus consisting of six or seven species of stove or greenhouse, erect or climbing, hoary-tomentose or glabrous, sometimes spiny shrubs, natives of South America and Mexico. Flower-heads small, sessile, homogamous, disposed in much-branched or thyrsoid panicles at the ends or sides of the branches; receptacle naked; corolla bilabiate, with the segments revolute, the outer three- or four-toothed, the inner lip deeply two-parted; achenes turbinate or oblong, five-ribbed, with a pappus of copious setæ. The under-mentioned species—the only one yet in cultivation—is a desirable greenhouse climber. For culture, *see* **Mutisia.**

P. pyrifolia (Pyrus-leaved).* *fl.-heads* white; pappus purple. *l.* petiolate, round-cordate or oval, tomentose beneath; adult ones coriaceous, densely tomentose beneath, entire or irregularly toothed. Chili, 1865. (B. M. 5489.)

PROVENZALIA. A synonym of *Calla*.

PRUINATE, PRUINOSE. Covered with glittering particles, as if frosted over.

PRUMNOPITYS. Included under **Podocarpus** (which *see*).

PRUNELLA (altered from *Brunella*, derived from the German *Die Braüne*, a disorder in the jaws and throat, which the plants were supposed to cure). The correct spelling, according to Bentham and Hooker, is *Brunella*. Self-heal. ORD. *Labiatæ*. A small genus (two or three species) of broadly-dispersed, decumbent or sub-erect, hardy perennial herbs. Flowers purplish, bluish, or white; calyx tubular-campanulate, two-lipped; corolla tube ample, often exserted, the upper lip erect, concave, the lower spreading; whorls six-flowered, in dense, terminal spikes, surrounded by broad, imbricated bracts. Leaves entire, incised-toothed, or pinnatifid. The species are well adapted for ornamenting rockwork, or the front of a flower border. They thrive in any light, rich soil, and may be readily increased by divisions.

P. grandiflora (large-flowered). *fl.*, corolla violet or purple, above 1in. long, more than twice the length of the calyx. August. *l.* petiolate, ovate, often toothed, especially at the base, sometimes sub-hastate, sometimes entire. *h.* 6in. Europe, 1596. This scarcely differs from *P. vulgaris*, of which it is probably a variety. (B. M. 337; F. D. 1933.)

P. hyssopifolia (Hyssop-leaved). *fl.* larger than those of *P. vulgaris*; corolla purplish, rarely white. August. *l.* sessile, oblong-linear or lanceolate, entire, strigose-hispid. Stems ascending, 6in. to nearly 12in. long, ciliate-hispid. Mediterranean region, 1731.

P. vulgaris (common). All-heal. *fl.*, calyx purplish; corolla purple, rarely rosy or white, ½in. to ¾in. long; whorls in cylindric spikes, 1in. to 3in. long. July to September. *l.* 1in. to 2in. long, petiolate, the uppermost ones sessile, ovate-oblong or oblong-lanceolate, entire, toothed, or sub-pinnatifid. Stems 4in. to 12in. long, erect or ascending. Europe (Britain). (Sy. En. B. 1059.) There are several varieties of this species.

PRUNING. Pruning consists in removing any part of a tree, either stem, branches, or roots, with a view to repressing growth in one direction, and directing the course of sap towards other parts of the tree which are better situated and constituted for performing the natural functions. The work is one of the most important in gardening, but, when the several habits and modes of fruit-bearing adopted by cultivated trees are understood, it is by no means difficult. Pruning is essential where trees have to be subjected to artificial treatment in a limited space, as in gardens generally, where, for example, a Plum-tree may be grown against a wall, or as a bush, pyramid, or standard. These shapes are produced by a combined system of Pruning and training to prepare trees for filling the several positions assigned them, and contributing a crop from one and all. There are several objects in Pruning, and the results attained vary exceedingly from the time and manner in which the work has been performed, and from other causes, some of which are beyond control. The thinning and removal of superfluous and useless shoots, with a view to admitting light and air, which are essential for insuring productiveness; the affording of encouragement towards promoting the formation of blossom-buds on branches hitherto barren; the modification of form in trained trees; the enlargement of fruit; the removal of dead, dying, or diseased branches, and many other such operations, may be cited as objects for which Pruning may be performed. One of the immediate effects of Pruning is to divert the course of the sap, which has hitherto been utilised by the branch removed, into others which are left; this causes them to strengthen and enlarge, which is one of the results generally aimed at. In the management of fruit-trees, the art of Pruning has a most important bearing, as, under artificial treatment, these have often to be cultivated in a limited space, and trained to a shape not in accordance with their natural habits. Again, on the system of management, in respect of thinning and removing the useless wood, and exposing that left to become well ripened, depends materially the state of the crops annually secured. The extent to which Pruning may with advantage be practised, depends very much on the subject under treatment, its rate of growth, and many other local circumstances. Some practitioners recommend a free, others a moderate, use of the knife; and others, again, use it as little as possible consistent with keeping their trees within bounds and preserving an evenly-balanced head. On a subject capable of such a wide and varied application, this is scarcely to be wondered at; and as different soils and localities have their own particular influence over the trees grown in them, so does the proper system of treatment vary somewhat in detail. Although hard Pruning is not here recommended, it is considered essential that the system must be moderately practised, and the work conducted with a view to preserving an equality and symmetry amongst the branches, which shall also, at the same time, promote vigour and fertility. Young trees are invariably disposed to produce more branches than space can be provided for. By thinning out those which are weak and misplaced, additional nourishment is supplied to the others, which may be allowed to develop, and remain almost, or quite, their full length. Where the system of training to be adopted cannot be commenced because of the shoots being improperly disposed, Pruning must be resorted to, and the sap thereby caused to flow more freely where it is required. If a young fruit-tree can be grown on without much cutting, until it arrives at a bearing state, it has, usually, much cleaner and healthier branches, which, of course, are more favourable to fruit-production than others developed under a system which involves frequent amputation, however much this may be necessary in training to a desired shape.

Pruning—*continued.*

The seasons when Pruning is most generally practised are summer and winter, summer Pruning being conducted at various times through the summer, and winter Pruning principally in December, January, and February. By adopting a proper system of summer pinching and stopping, much good may result to the branches retained, from their being more exposed to light, and there will be less need of cutting severely in the winter. When branches are allowed to grow at will, particularly towards the centre of a tree, they frequently become too vigorous for fruit-bearing themselves, and, by utilising the sap, render others unproductive. If attention to summer stopping in such cases is neglected, and the strong branches are removed at the next winter Pruning, it invariably happens that a difficulty arises in getting the flow of sap equalised, and the next spring others, even stronger shoots, start from the position where those of the previous year have been taken away. Summer Pruning then, in relation to permanent training, may be commenced so soon as the relative strength and position which the young shoots are likely to take, can be ascertained; it must be continued at intervals according to the subject under treatment and its natural mode of fruit-bearing. Trees that produce fruit on the short side branches, which are usually termed spurs, may be subjected to a course of summer Pruning, with a view to the production of those spurs furnished with blossom-buds. This work must not be performed before the shoots have reached a certain stage, else the buds at the base of the spurs left will develop into growth the same season, instead of remaining dormant, and forming themselves into fruit-buds for the next. July is generally the most suitable month: the wood is by that time partially solidified, and, if the leading branches are left unstopped, and there is a crop of fruit, most of the sap will be utilised. It not unfrequently happens that fruit-trees which bear on spurs become, from constant Pruning, too thickly furnished with them, and some get long and unfruitful. It is then best to cut some hard back at the winter Pruning, only leaving such as are properly situated. In most cases, other shoots will proceed the next year from near the place where the old spurs have been taken away, and these may, in due course, be subjected to similar treatment, and allowed to remain if there is sufficient space. The summer Pruning of fruit-trees which do not bear on spur branches is of an entirely different character. Apples, Apricots, Pears, and Plums—four of our principal fruits—bear more or less on spurs; but two others, also of great importance—Peaches and Nectarines—are usually managed so as to fruit on what is called young wood—that is, wood made during the previous year. Summer Pruning of these trees consists, therefore, in cutting out whatever wood is known to be useless, and in laying-in and encouraging new shoots to take its place. Disbudding may be considered a branch or part of Pruning, inasmuch as the young shoots removed thereby at an early stage have not to be taken out afterwards, and the full exposure to light, which is such an essential condition, is insured to the foliage of those that are allowed to remain.

At the winter Pruning, all trees should be examined, but much less work will be required where proper attention has been bestowed through summer; indeed, the operator will readily see why each of the shoots has been preserved, and will understand which have been left with the intention of being taken out during winter. All weak wood may always be cut away, but attention should be given to leaving eyes, if possible, to furnish wood afterwards where it is required, that, starting afresh, will possibly be of a stronger description the next year. As a rule, fruit-trees are more inclined to become crowded than to be too thin, especially in and about their centres; this must be guarded against, or sunshine and air cannot get the admission and circulation

Pruning—*continued.*

essential for ripening both fruit and wood. All dead wood should be cut out at the winter Pruning, and the leaving of sterile and unripened wood or spurs carefully avoided. In Pruning young trees that are intended for training into any particular shape, their form must always be borne in mind, and the leading branches kept at about regular distances from each other. Trees that are full grown, and have reached their intended limits, are most easily pruned in winter, as they require similar restriction and cutting each year, with a removal of some of the spurs and branches when the latter become too numerous. Occasionally, different varieties of a particular fruit require altogether a different system of Pruning, as, for instance, Cherries. All the sweet varieties of these should be pruned on the spur system, while the Morello bears best on the long, young shoots. At the winter Pruning, therefore, all the latter should be allowed to remain, so far as space can be provided for them. *See* **Cherry.** Notes on Pruning the different fruits named may also be found under **Currant, Fig, Gooseberry, Pear, Plum, Vine,** &c. Peaches are dealt with under **Nectarine.** Apple-trees that have not attained full dimensions should have about 1ft. left on the tops of the leading branches at each winter Pruning, and some side branches should also be left where there is sufficient room for them to develop. Others not required may be cut back to form spurs; these, and clusters of buds, are the methods of fruit-bearing which the Apple adopts. Apricot-trees fruit mostly on strong spurs, which must, therefore, be preserved; all the leading shoots must be trained and nailed in, and the side growths cut back for forming spurs. Unfortunately, the branches of these trees are liable to die away, one after the other, until, sometimes, the whole tree goes. Such branches must be cut away, and new ones encouraged to fill up the space: the old ones are those which die off most frequently. Apricot-trees have invariably to be grown on walls; any spurs which get old, and project a long way out, should be gradually taken away at the winter Pruning.

Root-pruning has a very important bearing in connection with top-growth and fruit-production; the two last named also often very materially depend on the sort of stock used for working upon. Some stocks are more fibrous-rooted than others, and are not so vigorous-growing—as, for instance, the Paradise and Quince stocks for the Apple and Pear respectively, in comparison with the Crab and wildling Pear. What was at one time performed, or attempted, solely by Pruning, is now much more readily attained, in these two important instances, by the use of stocks that favour a dwarf, pendulous habit, and great productiveness, instead of vigorous wood-growth, which seldom accompanies or precedes a fruitful habit. It is not, however, always desirable or practicable to cultivate trees on dwarfing stocks, and it is then that the effect of Root-pruning, when adopted, is most plainly marked. This operation is best performed in autumn, but it may be safely practised, under certain conditions, at almost any season, except during spring, and until the leaves have well expanded. No precise rules can be laid down as to when Root-pruning would be beneficial, but it usually proves so when fruit-trees make an over-luxuriant growth, and bear comparatively few blossom-buds. When practised in autumn, a trench should be dug out at a distance from the tree proportionate to its size; the soil may then be forked from the ball outwards, and the roots examined. If they are found long, and destitute of fibres, cutting off the leaders will induce them to produce small roots; and this will, doubtless, have the desired effect, eventually, of modifying and checking the top-growth in a corresponding manner, and also of increasing fertility. Top-

Pruning—*continued.*

growth is regulated by that beneath ground, and the necessity for Top-pruning is reduced to a minimum when the main leading roots are prevented from taking a wide-spreading or downward course, without being properly furnished with a due proportion of others of a fibry description. The necessity for Root-pruning may therefore be judged from the appearance of a tree above ground; the operation is not, of itself, desirable, but is a valuable means to an end whereby moderate growth and productiveness, more or less permanent, may be insured.

The remarks already made on this subject have reference more especially to the management of fruit-trees; but there are endless other subjects among which Pruning may, with advantage, be enforced. Deciduous and ever-

Pruning—*continued.*

numerous subjects amongst indoor plants benefited by judicious Pruning, to which it is unnecessary to refer in detail; indeed, it would be impossible to name them from memory. Some have to be pruned hard back each year, and others only require thinning to admit air and light amongst their leaves, to assist in perfecting the foliage, flowers, or fruits, as the case may be.

PRUNING KNIVES, &c. Of the several instruments in use for Pruning, the Knife is most generally in request, and, as it can be used for various other purposes, few things are more requisite. Pruning Knives are made in various shapes, some being nearly straight in the blade, while others are curved and carried to a point. Proper Pruning Knives are fixed into strong buckhorn handles, and are provided with a sheath to hold them when not

FIG. 299. BRANCH OF PRUNUS BIFERUM, showing Fruit not yet arrived at Maturity and Second Crop of Flowers from the Young Wood.

green forest and ornamental trees require frequent attention in order to keep them within proper limits, and induce them, particularly when young, to grow into shapes according to their habit, and the purpose for which they are required. Pyramid trees, for instance, generally need some Pruning to bring them into proper shape; and it is a frequent occurrence to find several leaders growing where there should only be one. Many evergreen shrubs, too, where they have to be kept within limits, need both summer and winter Pruning; otherwise, one would soon overgrow its neighbour, especially where some of a slow-growing and others of a fast-growing, nature are planted near each other. Summer Pruning amongst shrubs supplies almost constant employment, where shrubberies are extensive. When a severe cutting-back becomes requisite, as it sometimes does with Aucubas, Box, Laurel, Yew, &c., it should be attended to about April or May; the shrubs then soon recover. There are

in use; but those most extensively used for Pruning are made to shut up in the usual way, which renders them more portable. Buckhorn handles are best, as, having an irregular surface, they afford a grip for the hand. For small shoots, a straight-edged blade is preferred, but with a curved blade the operator has more command over a large branch.

Besides a Knife, most useful instruments are small Pruning Shears, or Sécateurs, and a Pruning Saw. There are various sizes and makes of the first-named in use, according to the size of the branches that are to be cut. Some have a movable centre, which causes them to draw and cut like a knife; others, very strong and well adapted for pruning Gooseberries, Roses, &c., are riveted together, and answer for the purpose most effectually. Pruning Saws are often required for removing branches that are too strong for the Knife or Shears. The blades are narrow, and somewhat like those employed for

Pruning Knives, &c.—*continued.*

turning, and for cutting circular holes in boards; they are carried very narrow at the point, and may be introduced to cut off one branch without injuring another.

PRUNOPSIS LINDLEYI. A synonym of **Prunus triloba** (which *see*).

PRUNUS (the ancient Latin name of the Plum). Plum. Ord. *Rosaceæ*. This genus, as arranged, by Bentham and Hooker, in the "Genera Plantarum," includes *Amygdalopsis*, *Amygdalus*, *Armeniaca*, *Ceraseidos*, *Cerasus*, *Laurocerasus*, and *Persica* (making a total of about eighty species); but, for horticultural purposes, it is, in most cases, deemed proper to treat these genera separately in this work. The species are evergreen or deciduous, hardy trees or shrubs, mostly natives of the temperate regions of the Northern hemisphere, some being found in tropical America, and rarely in tropical Asia. Flowers white or pink, solitary, corymbosely fasciculate, or disposed in racemes; calyx deciduous; tube obconical, urceolate, or tubulose; limb of five imbricated lobes; petals five, inserted at the mouth of the calyx; stamens fifteen to twenty, inserted with the petals. Fruit a fleshy, often edible drupe, containing a smooth or rugose, indehiscent or two-valved, one-seeded stone. Leaves alternate, simple, frequently serrulated, complicate or convolute in vernation. The species may be propagated by seeds, which should be stratified in autumn, and sown in the following spring. They may also, with the varieties, be readily increased by budding and grafting. *P. cerasifera* is well adapted for planting to form hedges; the use of the Blackthorn or Sloe, *P. spinosa*, is also well known for this purpose. *P. divaricata*, invariably one of the earliest-flowering shrubs or small trees, is exceedingly ornamental, when the flowers escape destruction by spring frosts. *P. Pissardii* has dark foliage, which is effective when associated with light-coloured or yellow-leaved shrubs. The double-flowered form of *P. sinensis* may be grown in pots, and used effectively for greenhouse decoration. It may readily be propagated, in spring, from cuttings of tolerably firm shoots; and when plants are established, and their wood well ripened, they force well. *P. triloba* may also be grown in pots, but the best position for this species is against a wall with a south or west aspect. For culture

Fig. 300. Fruit and Leaves of Prunus Chapronii.

Prunus—*continued.*

and varieties of the common Plum, *see* **Plum**, where will be found further information applicable to the propagation and cultivation of other species of *Prunus*. All the species described below are hardy, deciduous trees or shrubs, except where otherwise stated.

Fig. 301. Flowering Branch of Prunus pennsylvanica.

P. americana (American). American Wild Yellow or Red Plum. *fl.* white; pedicels few or several, in simple, umbel-like clusters. April. *fr.* yellow, orange, or red, ½in. to ¾in., or in cultivated states 1in. or more, in diameter, of a pleasant flavour, but with a tough and acerb skin. *l.* ovate or somewhat obovate, conspicuously pointed, coarsely or doubly serrated, glabrous when mature. *h.* 3ft. to 20ft. North America. Syn. *P. nigra* (B. M. 1117).

P. biferum (twice-bearing). *fl.* large, white, appearing in April on the old wood, in small, umbellate clusters, those appearing later at the ends of young shoots in short racemes. *fr.* stalked, regularly elliptic; skin smooth, glossy, tinted or spotted with violet-rose. *l.* broadly oval, narrowed to both ends. A vigorous-growing tree, of garden origin. For its peculiarity in bearing flowers and fruit at the same time, this curious Plum is worth growing. (R. H. 1875, 415.)

P. cerasifera (Cherry-bearing).* Cherry or Myrobalan Plum. *fl.* white, nearly solitary, or fascicled on short branches, pedunculate; calyx lobes reflexed; petals obovate-oblong or orbicular. April. *fr.* red, globose, with yellow flesh and an ovoid, acute stone. *l.* elliptic-obovate, acute, serrulated, glabrous beneath. Branches unarmed; branchlets highly glabrous. Native country uncertain. (B. M. 5934.)

P. Cerasus Bigarella (Bigarella). A synonym of *Cerasus duracina*.

P. Chapronii (Chapron's). *fr.* shining red, dotted with white, of an agreeable acid flavour, depressed globose, about 1¼in. in diameter. *l.* elliptic, acute, serrulate. 1883. A small, bushy tree, of unknown origin. See Fig. 300. (R. H. 1881, 467.)

P. dasycarpa (thick-fruited.) This is the correct name of the plant described in this work as *Armeniaca dasycarpa*.

P. divaricata (spreading).* *fl.* white, ¾in. in diameter, solitary; calyx lobes recurved; petals rounded, concave. April. *fr.* yellow, 1in. long, ellipsoid or globose. *l.* contemporary with the flowers, lanceolate, becoming more ovate and often sub-cordate at base, 2in. long, glabrous beneath; petioles slender. *h.* 10ft. to 12ft. Caucasus, &c., 1822. A small tree, branching at the base. (B. M. 6519.)

Prunus—*continued.*

P. domestica (domestic).* Common Plum. *fl.* white, usually solitary. Spring. *fr.* variable, both in shape and colour. *l.* ovate-lanceolate, convolute. Branches unarmed. *h.* 20ft.

Prunus—*continued.*

P. insititia (grafted). Black Bullace; Bullace Plum. *fl.* white; peduncles twin. Spring. *fr.* globular, black or white. *l.* ovate or ovate-lanceolate, convolute, downy beneath. Branches spiny

FIG. 302. FLOWERING BRANCH OF PRUNUS SINENSIS FLORE-PLENO.

England. There are numerous varieties of this species, including double-flowered and variegated-leaved, many of which are desirable for plantations, hedges, &c. The species and its varieties are deciduous. (Sy. En. B. 410.)

P. ilicifolia (Holly-leaved). A synonym of *Cerasus ilicifolius.*

at the apex. *h.* 10ft. to 15ft. Europe (Britain), Asia. A small, deciduous tree, with spreading, round branches. (Sy. En. B. 409.)

P. lævis (smooth). A synonym of *Persica vulgaris lævis.*

P. Laurocerasus. A synonym of *Cerasus Laurocerasus.*

P. maritima (sea-loving). Beach Plum. *fl.* white, borne on softly

Prunus—*continued.*

pubescent pedicels. April. *fr.* purple or crimson, with a bloom, globular, ½in. to 1in. in diameter, the stone very turgid. *l.* ovate or oval, finely serrated, softly pubescent beneath. *h.* 2ft. to 3ft. North America, 1800. Plant straggling.

P. Mume (Mume). *fl.* appearing early, usually twin, sub-sessile. *fr.* globose, very slightly velvety; stone oval, convex, foveolate. *l.* rounded at base, obovate or broadly elliptic, long-cuspidate, argutely duplicate-serrated, glabrous or mostly pubescent-scabrous beneath. Japan. (S. Z. F. J. ii.)

P. nigra (black). A synonym of *P. americana.*

P. paniculata (paniculate). A synonym of *Cerasus pseudo-cerasus.*

P. pennsylvanica (Pennsylvanian). American Wild Red Cherry. *fl.* white, many in a cluster, on long pedicels. May. *fr.* light red, globose, very small, with thin and sour flesh; stone globular. *l.* oblong-lanceolate, pointed, finely and sharply serrated, shining, green and smooth on both sides. Bark light reddish-brown. *h.* 20ft. to 30ft. North America, 1773. See Fig. 301.

P. Persica (Persica). A synonym of *Persica vulgaris.*

P. Pissardii (Pissard's).* *fl.* white. March and April. *fr.* small, or hardly medium size, somewhat oval, deep red or purple, even when very young; flesh pulpy, sugary when mature. *l.* glabrous, broadly oval, red-purple. Twigs glossy black. A handsome, ornamental shrub or small tree, introduced to Europe, a few years ago, from Persia. (R. H. 1881, 190.)

P. pumila (dwarf). This is the correct name of the plant described in this work as *Cerasus depressa.*

P. salicifolia (Willow-leaved). *fl.* white, small, growing singly or several together. April. *fr.* about the colour and size of those of *P. cerasifera.* *l.* obovate, acuminate, glossy and rugulose above, quite smooth beneath, finely serrulated, the serratures minutely glandular; petioles short, without glands. China.

P. sinensis (Chinese).* *fl.* white, small, disposed in clusters along the shoots. Spring. *fr.* small, globular, deep red, of peculiar but agreeable flavour. *l.* oblong, acuminated, serrulated. China, 1869. Of this species, there are varieties with rose and double white flowers. See Fig. 302.

P. spinosa (spiny). Blackthorn or Sloe. *fl.* white, rising before or with the leaves, on solitary peduncles. Spring. *fr.* black, roundish, sour or acid. *l.* obovate-elliptic or ovate, smooth except when young, sharply and doubly serrated. *h.* 10ft. to 15ft. Europe (Britain). A well-known, deciduous shrub, with spinose branches. (Sy. En. B. 408.) There are two or three varieties, including double-flowered, variegated-leaved, large-fruited, and egg-shape-fruited, forms.

P. subhirtella (somewhat hairy). *fl.* white, with a red calyx, small, borne three or four together on the short growths. *l.* small, ovate, acuminate. Branches pendent, with slender branchlets. *h.* 10ft. Japan, 1868. An elegant tree. SYN. *Cerasus pendula.*

P. triloba (three-lobed).* *fl.* white or rose, generally double, large. Early spring. *l.* three-lobed, appearing after the flowers. *h.* 6ft. China, 1857. A very handsome, early-flowering shrub. SYNS. *P. virgata* (of gardens), *Amygdalopsis Lindleyi* (F. d. S. xv. 1532; R. G. 1863, 53 and 54), *Prunopsis Lindleyi* (R. H. 1883, 367).

P. virgata (twiggy). A synonym of *P. triloba.*

PRURIENT. Stinging; causing an itching sensation.

PSAMMA (from *psammos*, sand; alluding to the use to which the species are put). Marrem Grass. ORD. *Gramineæ.* A small genus (two species) of hardy grasses, inhabiting the shores of Europe (Britain) and North Africa. Spikelets in a contracted panicle, much laterally compressed, one-fid; empty glumes two, scarcely exceeding the flowering ones, rigid, long, narrow, keeled; flowering glumes rigid, slightly pedicelled, with an oblique callus, and a small pencil of silky hairs at the base. *P. arenaria* is, on some parts of the coast, employed for binding sea sandbanks; it is also used for making mats and thatch. It grows freely in any sandy soil, and may be raised from seeds, but is most readily increased by cutting the long, creeping rhizomes into pieces, and planting them where required.

P. arenaria (sand-loving). *fl.*, spikelets erect; pedicels scabrid; panicle white, sub-cylindric, 3in. to 6in. long, straight, broadest and sometimes lobed at base, the branches short. July. *l.* long, rigid, convolute, polished without, scabrous and glaucous within; sheaths long; ligule very long, bifid. Stems 2ft. to 4ft. high. Rootstock widely creeping. (Sy. En. B. 1722.)

P. baltica (Baltic). This is very similar to *P. arenaria*; it chiefly differs in its looser, less cylindric panicles. (J. B., 1872, 127.)

PSAMMISIA (named after Psammis, or Psammites, a King of Egypt, B.C. 376). ORD. *Vacciniaceæ.* A genus comprising nearly thirty species of stove or warm greenhouse, branched, sometimes epiphytal shrubs, natives

Psammisia—*continued.*

of the Andes and the mountains of Venezuela and Guiana. Flowers frequently scarlet, rather large, disposed in axillary racemes or corymbs, rarely solitary or fascicled; calyx urceolate-campanulate, with a five-lobed or toothed limb; corolla tubular, ventricose or rarely conico-globose at base, with a five-lobed, erecto-patent limb; bracts sometimes pink. Leaves alternate, persistent, coriaceous, sessile or petiolate, entire or sub-serrate. The species best known in gardens are here described. For culture, *see* **Thibaudia.**

P. Hookeriana (Hooker's).* *fl.* (including the calyx) deep rose-red, paler at the mouth, nearly 1in. long, disposed in axillary and sub-terminal, four to six-flowered racemes. September. *l.* alternate, on short petioles, oblong-obovate, acuminate, but usually rather obtuse. *h.* 1½ft. to 2ft. (in its native place 6ft. to 12ft.). Columbia. (B. M. 4344, under name of *Thibaudia pichinchensis glabra.*) SYN. *P. pichinchensis glabra.*

P. Jessicæ (Mrs. John Bateman's).* *fl.* pale red, ¾in. long, between oblong and cylindric, fleshy; racemes short, solitary, from ten to twelve-flowered. September. *l.* ovate or ovate-lanceolate, 6in. to 10in. long, shortly petioled, rounded at the base, narrowed into a long, acuminate apex, quite entire. Branches pendulous. Caraccas, 1865. (B. M. 5547, under name of *Thibaudia Jessicæ.*)

P. longicolla (long-necked). *fl.*, corolla bottle-shaped, the widest and longest portion of the tube scarlet, the column or neck much contracted, and green, as are the five sub-triangular and somewhat spreading lobes of the limb; racemes short, axillary, glomerate, drooping, partially bracteolate; pedicels fleshy. Autumn. *l.* glossy, coriaceous, 3in. to 4in. long, shortly petioled, much acuminated, entire. *h.* 3ft. to 4ft. South America, 1865. (B. M. 5526.)

P. penduliflora (pendulous-flowered). *fl.* rich scarlet; corolla large, pitcher-shaped, suddenly contracted into a greenish, five-lobed apex; racemes solitary, axillary, many-flowered, secund, and drooping. *l.* about 4in. long, glossy-green, shortly petioled, elliptical, very entire, much and rather finely acuminated, sub-distichous, the base obtuse. Branches terete, green, tinged with red. Caraccas, 1860. (B. M. 5204.)

P. pichinchensis glabra (Pichincha, smooth). A synonym of *P. Hookeriana.*

P. sarcantha (fleshy-flowered). *fl.* red, tipped with green; corolla tubular-urceolate, fleshy, disposed in racemes or sub-umbellate; pedicels one-flowered. Spring. *l.* alternate, coriaceous, on short petioles. Stem erect, branched. New Grenada, 1864. (B. M. 5450, under name of *Thibaudia sarcantha.*) SYN. *P. sclerophylla.*

P. sclerophylla (hard-leaved). A synonym of *P. sarcantha.*

PSEUDÆGLE SEPIARIA. A synonym of **Citrus trifoliata** (which *see*).

PSEUDALANGIUM. A synonym of **Marlea** (which *see*).

PSEUDATHYRIUM. Included under **Polypodium** (which *see*).

PSEUDOBARLERIA (of Anderson). A synonym of **Petalidium** (which *see*).

PSEUDO-BULB. A bulb in appearance, but not in structure; a corm; the thickened internode in epiphytal Orchids.

PSEUDODRACONTIUM (from *pseudo*, false, and *Dracontium*; in allusion to its resemblance to that plant). ORD. *Aroideæ* (*Araceæ*). A genus comprising only a couple of species of stove, tuberous herbs, natives of Cochin China. Male flowers scattered; females densely crowded; spathe erect, boat-shaped, acute, shortly convolute at base, opening above; spadix shorter than the spathe, thick, sessile; peduncle much shorter than the petiole. Leaves trisected, the segments cut or pinnate; pinnæ lanceolate, acuminate, the upper ones confluent and decurrent, the lower ones remote and sessile; petioles elongated, thick, sheathing at base. One species has been introduced; it requires culture similar to **Caladium** (which *see*).

P. Lacourii (Lacour's). This is the correct name of the plant described in this work as *Amorphophallus Lacouri.*

PSEUDOLARIX (from *pseudo*, false, and *Larix*, the Larch, which it resembles). False or Chinese Larch; Golden Larch. ORD. *Coniferæ.* A monotypic genus, the species being a noble, hardy tree. It is distinguishable

Pseudolarix—*continued.*

from the European Larches by the cones having deciduous scales, with divergent points. For culture, *see* **Pinus.**

P. Kæmpferi (Kæmpfer's).* *l.* in bundles on the adult branches, singly on the leading shoots and young plants, slim, linear-lanceolate, tapering to the point, 1½in. to 2½in. long, one line broad, beautiful bright green when young, but becoming golden-yellow in autumn. *cones* pendulous, 3in. long, 2½in. wide near the base, conical, with deciduous scales. Branches similar to those of *Larix europæa*. *h.* 120ft. to 130ft. China. See Fig. 303. (F. d. S. 1777.) SYN. *Larix Kæmpferi.*

FIG. 303. BRANCH OF PSEUDOLARIX KÆMPFERI, WITH MALE CATKINS.

PSEUDOPANAX (from *pseudos*, false, and *Panax*). ORD. *Araliaceæ*. A genus comprising four species of greenhouse, evergreen, glabrous shrubs or small trees, two of which are from New Zealand, and the others natives of Chili. Flowers in small, racemose or paniculate umbels; petals and stamens five, the former valvate; pedicels articulated below the flowers. Fruit sub-globose. Leaves digitate or simple; leaflets coriaceous, often slightly toothed. The two species here described are those introduced to cultivation. For culture, *see* **Aralia.**

P. crassifolium (thick-leaved). *l.* alternate, 2ft. long, and about 1in. broad, thick and fleshy, having a few obtuse, distant lobes along the edges, which end in a short spine; upper surface dark olive-green; midrib prominent, deep orange. *h.* 10ft. New Zealand, 1846. SYNS. *Aralia crassifolia*, *Panax crassifolium*, *P. longissimum*. A garden variety, known as *punctata*, is in cultivation; the leaves are not so thick as those of the type, the marginal lobes are not so blunt, and the colour is dark olive-green, with a continuous line of emerald-green blotches all along, on either side of the midrib.

P. Lessonii (Lesson's). *fl.* rather large; umbels branched, on stout peduncles; pedicels racemose. *fr.* ovoid, ¼in. long. *l.*, on old plants, three to five-foliolate; leaflets 1in. to 4in. long, sessile, oblong- or obovate-lanceolate, slightly acute, sinuate-serrate or quite entire, very thick and coriaceous; petioles 4in. to 8in. long. New Zealand. A small, glabrous tree, with very stout branches. SYN. *Aralia trifolia.*

PSEUDOS. A prefix, in Greek composition, signifying false; *e.g.*, Pseudo-costate, false-ribbed.

PSEUDOSCORDUM. A synonym of **Nothoscordum** (which *see*).

PSEUDOTSUGA (from *pseudos*, false, and *Tsuga*). ORD. *Coniferæ*. A monotypic genus, the species being a tall, hardy, evergreen tree. For culture, &c., *see* **Pinus.** A large number of forms, sports, or seedling variations, are grown in some nurseries, under distinctive names.

P. Douglasii (Douglas').* *l.* flat, blunt, entire, pectinate, silvery beneath, 1in. to 1½in. long, two-rowed. *cones* ovate-oblong, about 4in. long, 1½in. to 1¾in. broad; scales broad, rounded, with conspicuous, projecting, deeply-toothed bracts. *h.* 100ft. to 180ft. North America, 1826. A splendid tree, requiring a somewhat sheltered position, not near the sea-coast. (R. H. 1868, p. 152, under name of *P. Lindleyana*.) SYN. *Abies Douglasii.* There are several varieties, the best of which are:

P. D. pendula (drooping). A variety with elegant, drooping branches. *h.* 50ft.

P. D. Standishii (Standish's). A seedling, with larger leaves than the type, with a deeper green tint above, and quite silvery beneath.

P. D. taxifolia (Yew-leaved). A form with longer leaves and stouter branches, of much dwarfer habit, and more massive, than the normal species.

PSIDIUM (from *Psidion*, the Greek name of the Pomegranate). Guava. ORD. *Myrtaceæ*. A genus of stove trees, shrubs, or rarely sub-shrubs, often villous or tomentose, all (perhaps with the exception of one inhabiting tropical Eastern Asia) natives of tropical and sub-tropical America, one being broadly cultivated over the tropical regions of the globe. Upwards of 100 species have been enumerated, but, according to the authors of the "Genera Plantarum," this number may be considerably reduced. Flowers rather large or rarely small, on axillary or lateral, one to three (rarely many) flowered peduncles, cymose; calyx tube campanulate, urceolate, or pear-shaped, scarcely exceeding the ovary, or more or less produced; lobes of limb four or five; petals four or five, spreading. Berries globose, ovoid, or pyriform, crowned with the calyx limb, or naked; seeds few or many, subreniform, hard. Leaves opposite, penniveined. The species thrive best in a compost of sandy, fibry loam,

FIG. 304. FRUITING BRANCH OF PSIDIUM CATTLEYANUM (much reduced).

Psidium—*continued.*

to which a small quantity of leaf mould and dried cow-dung should be added; the drainage must be perfect. Propagated by cuttings of the young shoots, getting a little firm at their base, inserted in sand, under a bell glass, in bottom heat. The following species are occasionally seen in cultivation:

P. aromaticum (aromatic). *fl.* white, solitary. July. *fr.* yellow, globose, four-celled, hardly the size of a cherry. *l.* oblong, acuminated, glabrous. Branchlets tetragonal. *h.* 5ft. to 8ft. Guiana and Cayenne, 1779. Shrub.

P. Cattleyanum (Cattley's).* *fl.* white; pedicels opposite, one-flowered, hardly equal in length to the petioles. May. *fr.* of a fine deep claret-colour, rather large, nearly spherical, growing in the axils of the leaves; the skin has much the consistence of that of a fig, but is thinner; the interior is a soft, fleshy pulp, purplish-red next the skin, but becoming paler towards the middle, and at the centre is quite white; it is juicy, and in consistence is much like a strawberry, to which it bears some resemblance in flavour. *l.* obovate, coriaceous, quite glabrous. Branchlets terete, glabrous. *h.* 10ft. to 20ft. Brazil, 1818. Shrub. See Fig. 304. (B. M. 2501; B. R. 622.)

P. cordatum (heart-shaped). *fl.* white; peduncles one or few-flowered; anthers roundish. May to July. *l.* ovate or oval, rounded at both ends or cordate at base, sessile or shortly petioled, the veins obsolete or inconspicuous. Branches compressed-cylindrical. *h.* 5ft. West Indies, 1811. Shrub. (B. M. 1779.)

P. Guava (Guava). *fl.* white; peduncles three to eight, or many-flowered, downy. June. *fr.* yellow, globose, somewhat astringent, with an agreeable odour. *l.* oval or oblong, elliptic, puberulous beneath. Branches tetragonal. *h.* 6ft. to 15ft. West Indies, &c., 1692. A low tree. SYN. *P. pomiferum.*

P. polycarpum (many-fruited). *fl.* white; calyx closed in the bud; anthers oblong; peduncles usually three-flowered. May. *l.* chartaceous, elliptical or oval-oblong, puberulous beneath; primary veins costate, prominent beneath; secondary ones reticulated and transverse. Branchlets compressed-cylindrical, pubescent. *h.* 3ft. Trinidad, 1810. Shrub. (B. R. 653.)

P. pomiferum (Apple-bearing). A synonym of *P. Guava.*

P. pyriferum (Pear-bearing). Common Guava. *fl.* white, solitary. June. *fr.* yellowish when ripe, pear-shaped; pulp sweet, aromatic, and pleasant. This low tree is simply a form of *P. Guava.* (B. R. 1079.)

PSILA ROSÆ. *See* **Carrot Grubs.**

PSILODOCHEA. Included under *Angiopteris.*

PSILOGYNE. A synonym of **Vitex** (which *see*).

PSILONEMA. Included under *Alyssum.*

PSILOS. Used in Greek compounds, this term signifies thin (Lindley), also naked or bare (Asa Gray).

PSILOSANTHUS. A synonym of *Liatris.*

PSILOSTEMON. A synonym of **Trachystemon** (which *see*).

PSILOSTOMA. A synonym of **Plectronia** (which *see*).

PSILOTUM (from *psilos*, naked; the plants are almost destitute of leaves). ORD. *Lycopodiaceæ.* A genus containing very numerous forms, which are, however, according to Mr. Baker's unpublished Synopsis of the *Lycopodiaceæ*, reducible to two species. The one here described is a curious club-moss, inhabiting the tropical and sub-tropical regions of both hemispheres. It is of little horticultural value. It thrives in well-drained pots of fibrous peat, or may be grown on pieces of such tree ferns as *Dicksonia antarctica.*

P. triquetrum (three-sided). Stems dichotomously forked, compressed or angular, rigid, erect or slender, pendulous; branches numerous, triquetrous. *l.* obsolete or small, bract-like, shortly linear. Sporangia sub-globose, vertically trivalved, solitary in the axils of the leaves. *h.* 9in. 1793. (L. B. C. 1916.)

PSITHYRISMA. A synonym of **Symphyostemon** (which *see*).

PSORALEA (from *psoraleos*, warted or scurfy; in reference to the plants being, for the most part, sprinkled all over or roughened with glandular dots or wart-like points). Scurfy Pea. ORD. *Leguminosæ.* A large genus (about 100 species have been described) of greenhouse or hardy, annual, biennial, or perennial herbs, shrubs, or sub-shrubs, inhabiting South Africa, North and South America, Australia, and the tropical and temperate regions of Asia, Europe, and North Africa. Flowers

Psoralea—*continued.*

purple, blue, pink, or white, capitate, spicate, sub-racemose, or fasciculate, rarely solitary; calyx lobes sub-equal or at length larger, the two upper ones often connate; petals nearly as long, or shorter than the keel; standard ovate or orbiculate. Leaves usually compound, consisting of three to five leaflets, though occasionally the leaves are simple; stipules adhering to the stalk. The Cape species thrive in well-drained, sandy peat, and the others in ordinary garden soil. The shrubby kinds are increased, in April or May, by cuttings of the half-ripened shoots, inserted in sand, under a glass. The herbaceous species are propagated by divisions when the new growth commences. The following is a selection of the best kinds introduced. Except where otherwise stated, they are greenhouse, Cape shrubs.

P. aculeata (prickly).* *fl.* blue and white mixed, axillary, solitary, sessile, approximate. June and July. *l.* trifoliolate; leaflets cuneiform, ending in a recurved mucrone, glabrous; stipules prickle-formed. *h.* 2ft. to 3ft. 1774. (B. M. 2158.)

P. aphylla (leafless). *fl.* blue; keel and wings white; pedicels axillary, short, solitary, one-flowered. May to August. *l.*, lower ones simple or trifoliolate; leaflets linear-lanceolate, upper ones abortive, scale-formed. *h.* 4ft. to 7ft. 1790. (B. M. 1727.)

P. arborea (tree-like). *fl.* bluish; pedicels axillary, one-flowered, longer than the leaves. May. *l.* impari-pinnate; leaflets linear-lanceolate; stipules recurved. *h.* 6ft. to 8ft. 1814. (B. M. 2090.)

P. glandulosa (glandular). *fl.* white, marked with blue, disposed in axillary, spicate racemes; bracts very small, ciliated. May to September. *l.* ternate; leaflets ovate-lanceolate, acuminate; petioles scabrous. Stem erect. *h.* 4ft. Chili, &c., 1770. Half-hardy shrub. (B. M. 990.)

P. melilotoides (Melilot-like). *fl.* pale purple; peduncles racemose; racemes or spikes linear. August. *l.* pinnately trifoliolate; leaflets lanceolate, glandular beneath. *h.* 1ft. to 2ft. North America, 1814. Hardy perennial herb. (B. M. 2063; B. R. 454.)

P. Mutisii (Mutis'). A synonym of *Dalea Mutisii.*

P. pinnata (pinnate-leaved).* *fl.* blue, striped; pedicels axillary, one-flowered, much shorter than the leaves. May to July. *l.* impari-pinnate; leaflets two or three pairs, linear, and, as well as the branchlets, slightly puberulous. *h.* 3ft. to 6ft. 1690. (A. B. R. 474.)

PSYCHOTRIA (from *psyche*, life; referring to the powerful medicinal qualities possessed by several of the species). SYNS. *Myrstiphyllum, Psychotrophum.* Including *Gloneria.* ORD. *Rubiaceæ.* A genus comprising about 500 species of stove shrubs or small trees, rarely perennial herbs, erect, climbing, or twining, all inhabiting tropical regions. Flowers white, green, pink, or yellow, variously disposed; calyx tube short, limb rarely persistent; corolla funnel-shaped, tubular, or sub-campanulate, with a limb of five, rarely four or six, valvate lobes. Leaves opposite, very rarely ternately or quaternately whorled. The species are mostly unattractive, those described below being all that call for mention here. For culture, *see* **Ixora.**

P. chontalensis (Chontales). *fl.* white, in axillary panicles. *fr.* deep blue, usually from forty to sixty on a bunch, presenting a very handsome appearance. Nicaragua, 1870. A very ornamental herb, allied to *P. cyanococca*, but altogether more robust and hairy.

P. cyanococca (blue-fruited).* *fl.* white. *fr.* bright blue, ripening in winter, and disposed in dense clusters of from thirty to forty berries. *l.* elliptic, slightly undulated at the margin. Nicaragua, 1870. A dwarf herb useful as a decorative plant in winter. (F. d. S. 1938; F. M. 479.)

P. jasminiflora (Jasmine-flowered).* *fl.* snowy-white, sub-sessile, in terminal, corymbose panicles; corolla funnel-shaped; tube terete, long, graceful; throat dilated; limb four-parted, spreading. *l.* shortly petiolate, coriaceous, ovate-oblong, shortly acuminate, entire, glabrous above, clothed with white tomentum beneath; margins sub-revolute. A beautiful shrub. (B. M. 6454; G. C. n. s., xii. 200; I. H. xviii. 60, under name of *Gloneria jasminiflora.*)

PSYCHOTROPHUM. A synonym of **Psychotria** (which *see*).

PSYDRAX. A synonym of **Plectronia** (which *see*).

PSYLLA. A large genus of small insects, nearly related to Aphides, which they resemble in their general appearance They feed on the leaves and young branches

Psylla—*continued.*

of plants, sucking the sap through their long beaks. They frequently live in company, and are often more or less covered with a cottony secretion. Some species give rise to distortions of such a kind as to cause them to be reckoned among gall-makers. In repose, the wings are sloped over the back like a penthouse, and the front pair are rounded at the tip. These insects may be known from Aphides by their rather larger size, rounded wings, and harder bodies, and, above all, by their power of leaping, which is given by the strong, thick thighs. They do not show the rapid vegetative reproduction or budding so general among Aphides. The species are found on many different woody plants, and all have very similar habits. Several occur on the Pear-tree (*see* remarks on INSECTS under **Pear**), of which *P. pyrisuga*

FIG. 305. PSYLLA PYRISUGA (the Line below the Insect shows the natural length).

(see Fig. 305) is probably most hurtful; and *P. Mali*, at times, does much harm to Apples. They secrete from their bodies a sweet, clammy substance, which is produced at the expense of the fluids of the plants, and falls on and clogs the surfaces of the leaves. This weakens the food-plants considerably. During winter, many of these insects are hidden in the crevices of the bark, or in similar shelters; hence, no such retreat should be permitted to exist in the neighbourhood of valuable trees that suffer from their attacks.

Remedies. Remove all facilities for concealment from the trees and shrubs. It has been recommended to wash the branches and leaves first with a solution of 2oz. soft soap to a gallon of water, and to follow this up with tobacco-water, Gishurst's Compound, or other insecticides, as recommended under **Aphides** (which *see*). These may be pumped on to the trees from a garden engine.

PTARMICA. Included under *Achillea.*

PTELEA (the ancient Greek name of the Elm, used from the time of Homer, here applied to a genus with similar fruit). ORD. *Rutaceæ.* A genus consisting of six species of hardy, unarmed shrubs or small trees, natives of temperate North America. Flowers greenish-yellow, cymose or corymbose, polygamous; calyx short, four or five-parted, imbricated; petals four or five, much longer than the calyx, imbricated. Leaves alternate, rarely opposite, trifoliolate or pinnately five-foliolate; leaflets ovate or oblong, pellucid-dotted, entire or serrulate. The under-mentioned species—probably the only one in cultivation—thrives in any common garden soil, and is readily increased by layers.

P. trifoliata (three-leaved). Hop-tree; Swamp Dogwood, &c. *fl.*, filaments four or five, densely villous below the middle, longer than the style in the sterile flowers, shorter in the fertile ones. May and June. *l.* long-stalked; leaflets oval or oblong, mostly acute, obscurely crenulated, paler beneath, the lateral ones unequal-sided. *h.* 4ft. to 8ft. 1704. (G. C. n. s., xiii. 369.)

P. t. aurea (golden). This only differs from the type in the golden-yellow colour of the young foliage.

PTELIDIUM (so named from its similarity to *Ptelea*). SYN. *Seringia.* ORD. *Celastrineæ.* A monotypic genus, the species being an ornamental, stove shrub. It thrives best in a compost of loam, peat, and sand. Cuttings of the ripened wood will root readily, if inserted in sand, under a glass, in heat.

P. ovatum (ovate-leaved). *fl.* green, minute, in axillary and terminal cymes, which are shorter than the leaves; calyx segments and petals four. June. *l.* opposite, coriaceous, petiolate, ovate, entire. *h.* 3ft. Madagascar, 1818.

PTERIS. A Fern; the term is also used in Greek compounds to signify a wing, *e.g.*, Pterocarpous, wing-fruited.

PTERIS (the old Greek name for a fern, used by Dioscorides, so called from *pteron*, a feather; in allusion to the shape of the fronds). Brake or Bracken. Including *Amphiblestra, Campteria, Doryopteris, Heterophlebium, Litobrochia, Ornithopteris, Pæsia, Pycnodoria,* &c. ORD. *Filices.* A rather large, cosmopolitan genus (upwards of seventy species) of stove, greenhouse, or hardy ferns, including plants of almost every kind of venation and division. Sori marginal, linear, continuous, occupying a slender, filiform receptacle in the axis of the involucre; involucre the same shape as the sorus, usually membranous, at first quite covering it, at length more or less spreading. Except where otherwise indicated, the under-mentioned species require stove treatment. For culture, &c., *see* **Ferns.**

P. albo-lineata (white-lined). A form of *P. cretica.*

P. aquilina (eagle-like). Adder-spit; Common Bracken or Brake Fern; Eagle Fern. *rhiz.* wide-creeping, stout, subterraneous. *sti.* 1ft. or more long, strong, erect, straw or pale chestnut-coloured. *fronds* 2ft. to 4ft. or more long, 1ft. to 2ft. broad, subdeltoid; uppermost pinnæ simple; those next in order lanceolate, cut nearly or quite to the rachis into triangular or linear pinnules; the lowest pinnæ long-stalked, 1ft. or more long, with ample, lanceolate pinnules, the latter cut down to the rachis into numerous lanceolate segments, which are again fully pinnate; largest entire ultimate divisions 1in. long, ⅛in. broad; rachis and both surfaces sometimes pubescent. Involucre double, or the

FIG. 306. PTERIS ASPERICAULIS TRICOLOR.

Pteris—*continued.*

inner one obsolete. Ubiquitous (Britain). Many varieties of this species have been found, but they are not constant in cultivation.

P. a. esculenta (edible). Edible Fern of Tasmania. In this variety, the ultimate divisions are narrower than in the type, and not contiguous, and are suddenly decurrent at the base, so that the bases are connected by a narrow lobe. Southern hemisphere, 1850. Greenhouse. The glutinous, underground rhizome of this variety is eaten by the aborigines. SYN. *P. esculenta.*

Other varieties calling for mention are: *glabra*, a smooth, and *lanuginosa*, a woolly, form.

P. arguta (sharply-notched).* *sti.* 1ft. or more long, strong, erect, bright straw-coloured or reddish-brown. *fronds* 1ft. to 3ft. long, 1ft. or more broad; terminal pinna 6in. to 9in. long, 1½in. to 2in. broad, lobed nearly to the rachis, the lobes slightly toothed when barren; pinnæ several on each side, similar to the terminal one, the lowest forked, or with one or two similar smaller pinnules from the base on the lower side. *sori* not usually extending beyond the lower half of the lobes. Madeira, &c., 1778. Greenhouse.

P. argyræa (silvery). A variety of *P. quadriaurita.*

P. aspericaulis (rough-stalked).* *rhiz.* erect. *sti.* rough, purplish when young. *fronds* 1½ft. long, glabrous, pinnate; lowermost pinnæ bipartite, nearly sessile, and opposite; pinnæ deeply pinnatifid or pinnate, attenuated, adnate towards the apex; segments linear falcate, decurrent at base, rather obtuse, slightly crenulate, minutely white-dotted beneath. *sori* chiefly on the middle parts of the segments. India. The variety *rubro-nervia* has a deep purplish-red rachis and midrib.

P. a. tricolor (three-coloured). *fronds*, when young, a beautiful red; when fully developed, a rich, deep green, with attractive silvery markings along the sides of the midribs, which are red. See Fig. 306. SYNS. *P. quadriaurita tricolor* (B. M. 5183), *P. tricolor.*

P. atrovirens (dark green). *sti.* 1ft. long, prickly. *fronds* 1ft. to 2ft. long; terminal pinna 6in. to 9in. long, 2in. to 3in. broad, cut nearly to the rachis into numerous linear lobes, which are slightly toothed when barren; lateral pinnæ in numerous opposite pairs, the lowest sometimes 1ft. long, the lobes similar to those of the terminal one; the lowest pair forked, with a similar, smaller pinnule on the under side; rachis of the pinnules occasionally prickly beneath. *sori* not reaching to the points of the segments. Guinea Coast and Angola. SYN. *P. spinulifera.*

P. aurita (eared). A form of *P. incisa.*

P. biaurita (two-eared). *sti.* 1ft. to 2ft. long, strong, erect, straw-coloured. *fronds* with a terminal pinna, 6in. to 12in. long, 1½in. to 2in. broad, cut nearly to the rachis into numerous spreading, linear-oblong lobes, 1in. or more long; lateral pinnæ similar to the terminal one, the lower ones 2in. apart, and usually once-forked. *sori* continued to the apex. Tropics, &c., 1824. SYN. *Campteria biaurita. P. nemoralis* is, according to Mr. Baker, not distinct from this species.

P. brasiliensis (Brazilian). A form of *P. denticulata.*

P. collina (hill-loving). A synonym of *P. palmata.*

P. comans (hairy). *sti.* 1ft. or more long, erect. *fronds* bipinnate; terminal pinna 1ft. or more long, cut nearly to the rachis into long-linear lobes, which are sometimes 4in. long, ¼in. broad, suddenly decurrent at base, bluntly toothed when

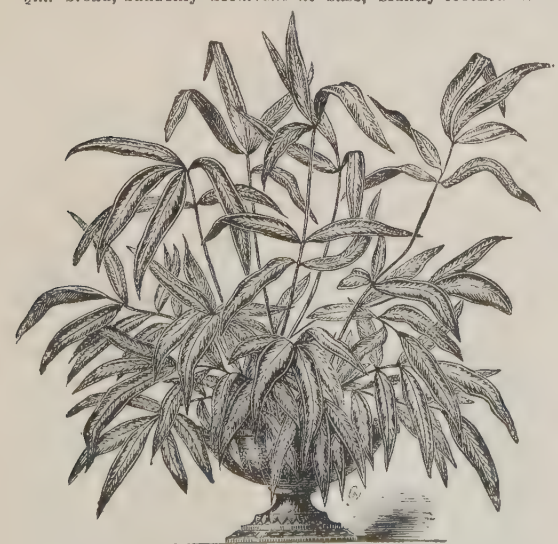


FIG. 307. PTERIS CRETICA ALBO-LINEATA.

Pteris—*continued.*

barren; lateral pinnæ in a few opposite pairs, sometimes 1½ft. long, 6in. broad, the lowest sometimes slightly compound at the base. *sori* falling short of the apex of the segments. East Indies, 1860. SYN. *Litobrochia comans.* The variety *undulata* differs from the type in having blunter ultimate segments, with an undulated edge.

P. concinna (neat). A form of *P. mutilata.*

P. crenata (scolloped). A synonym of *P. ensiformis.*

P. cretica (Cretan).* *sti.* 6in. to 12in. long, erect, wiry, straw-coloured or pale brown. *fronds* 6in. to 12in. long, 4in. to 8in. broad; lateral pinnæ usually in two to six opposite, sessile pairs, the upper one sometimes a little decurrent, 3in. to 6in. long, ⅛in. to ¾in. broad, the sterile ones much the broadest and spiny-toothed, the lower pairs often cleft down nearly to the base into two or three linear pinnules. Involucres pale, membranous. Temperate and tropical regions, &c., 1820. Greenhouse. There is a variegated form of this species, *albo-lineata.* See Fig. 307. (B. M. 5194.)

P. crispa (curled). A garden synonym of *P. straminea.*

P. Currori (Curror's). *sti.* stout, erect, straw-coloured. *fronds* ample, several feet long, 2ft. or more broad; terminal pinna sub-hastate, deeply lobed; lateral pinnæ numerous, the upper ones 4in. to 6in. long, 1in. broad, with deeply and broadly sinuated margins, the lowest in opposite, sessile pairs, 2in. to 3in. distant from the next pair, 16in. long, 5in. broad, cut nearly to the rachis in the lower part into lanceolate, sinuated lobes, 3in. deep; rachis and both surfaces slightly hairy. *sori* in numerous patches, which are sometimes interrupted and very short. Western tropical Africa. (H. S. F. 140.) SYN. *Litobrochia Currori.*

P. decussata (decussate). A synonym of *P. patens.*

P. deflexa (deflexed). *sti.* 2ft. or more long, strong, erect, straw-coloured or reddish-brown. *fronds* 2ft. to 4ft. long; terminal pinna 6in. to 9in. long, about 1in. broad, long-pointed, and with numerous oblong-linear lobes on each side, which are nearly cut down to the rachis, about ½in. long, ¼in. broad, the barren ones sharply spinulose-serrated; lateral pinnæ numerous, similar, the lower ones stalked; lowest pair much larger than the others, often more than 1ft. long, 6in. to 9in. broad, with numerous pinnate pinnules on each side. *sori* reaching nearly to the apex of the segments. Brazil, 1844.

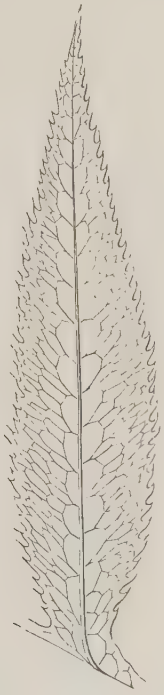


FIG. 308. UPPER PINNA OF PTERIS DENTICULATA.

P. denticulata (slightly-toothed). *sti.* about 1ft. long, slender, wiry. *fronds* 1ft. to 2ft. long, 8in. to 12in. broad; upper pinnæ simple, linear, 4in. to 6in. long, united at base, finely spinulose-serrate when barren; those next in order cut to the rachis and forked; lower ones often pinnatifid, with several linear pinnules, especially on the lower side. *sori* not quite reaching the points of the pinnules. Tropical America, 1824 SYN. *Litobrochia denticu-*

Pteris—*continued.*

lata. See Fig. 308. *P. brasiliensis* is a form with broader, more compound pinnæ.

P. elata (tall). *sti.* 2ft. to 3ft. long, erect, naked, straw-coloured. *fronds* ample, tripartite; terminal pinna 1ft. to 1½ft. long, cut nearly or quite to the rachis into numerous linear lobes on both sides, which are 3in. to 5in. long, the barren ones spinulose-serrate; upper lateral pinnæ 6in. long, not cut to the rachis; lower ones equalling the terminal one; lateral divisions of the frond deltoid. *sori* falling short of the points of the segments. Tropical America. SYN. *Litobrochia elata.*

P. elegans (elegant).* *sti.* 1ft. or more long. *fronds* 6in. to 12in. long, deltoid-cordate, pedate-bipinnatifid; divisions close, reaching nearly to the midrib; terminal and upper lateral ones lanceolate, entire, 1in. to 1½in. broad; lower ones with one to four lanceolate pinnules on the lower side, usually none from the upper. *sori* continuous from base to tip of the divisions. South Brazil. A common species in cultivation. SYN. *Doryopteris nobilis.*

P. ensiformis (sword-shaped). *sti.* 3in. to 6in. long, slender, erect, straw-coloured. *fronds* 6in. to 12in. long, half as broad, with a long terminal pinna and two to four pairs of lateral ones; those of the fertile frond slightly compound, the central portion 2in. to 4in. long, ¼in. or less broad, entire; upper pinnæ of the barren frond decurrent, the lower ones sub-deltoid, cut down to the rachis below into two to six obovate-oblong, sharply-toothed pinnules, which are often nearly ½in. broad. India, &c. SYN. *P. crenata* (H. S. F. 127A).

P. esculenta (edible). A synonym of *P. aquilina esculenta.*

P. fallax (deceptive). A synonym of *Pellæa intramarginalis serratifolia.*

P. felosma (heavy-smelling). A form of *P. quadriaurita.*

P. flabellata (fan-shaped).* *sti.* 1ft. or more long, strong, erect, straw-coloured. *fronds* 1ft. to 3ft. long, 1ft. or more broad; terminal pinna 6in. to 12in. long, 2in. to 3in. broad, numerously lobed nearly to the rachis, the lobes linear, 1in. to 2in. long, barren ones finely serrated; lateral pinnæ similar to the terminal one, the lowest with one to three similar, smaller pinnules from the base on the lower side. *sori* narrow, continuing along nearly the whole length of the segments. South Africa. This species is closely allied to *P. arguta.*

P. Gheisbreghtii (Gheisbreght's). A variety of *P. laciniata.*

P. glauca (glaucous). A synonym of *Pellæa glauca.*

P. gracilis (slender). A synonym of *Pellæa gracilis.*

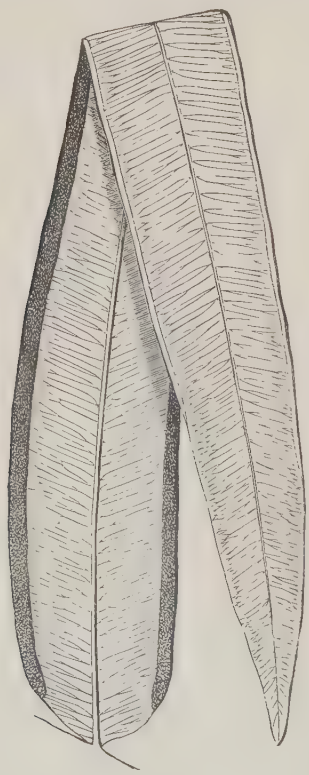


FIG. 309. PINNA OF PTERIS GRANDIFOLIA.

Pteris—*continued.*

P. grandifolia (large-fronded). *sti.* 6in. to 12in. long, erect, straw-coloured, clothed below with rusty-woolly scales. *fronds* 1ft. to 2ft. long, simply pinnate; pinnæ linear, erecto-patent, entire, sessile or the lower ones stalked, the lower ones 6in. to 12in. long, hardly 1in. broad. *sori* often continuous along the whole length of the pinnæ. Tropical America. See Fig. 309. (H. S. F. 113B.) SYN. *Litobrochia grandifolia.* The variety *vittata* has nearly free veins.

P. hastata (spear-shaped), of Thunberg. A synonym of *Pellæa calomelanos.*

P. heterophylla (variable-fronded).* *sti.* wiry, slender, erect, straw-coloured. *fronds* 6in. to 12in. long, 3in. to 6in. broad, ovate-deltoid, tripinnate; pinnæ all, except two or three of the highest, compound, the lowest deltoid, with the pinnules again pinnatifid; ultimate segments of the barren frond ovate, sharply and deeply toothed, cuneate and entire at base, about ¼in. long, ⅛in. broad, those of the fertile frond about ⅜in. long, ⅛in. broad, the tip sterile and toothed. Involucres broad, pale, membranous. West Indies and Brazil, 1820. (B. M. 4925.)

P. Hookeriana (Hooker's). *sti.* 6in. to 12in. long, erect, pale. *fronds* 9in. to 12in. long, 6in. to 9in. broad, with a long, linear, entire, terminal pinna; lateral pinnæ two to six pairs, sessile, opposite, entire, the largest about 6in. long and ⅜in. broad, the lowest forked at the base. *sori* slightly intramarginal; involucres narrow, brownish. Ceylon.

FIG. 310. CENTRAL PINNA OF PTERIS LEPTOPHYLLA.

P. incisa (cut). Bat's-wing Fern. *sti.* stout, erect, straw-coloured or bright brown. *fronds* several feet long, bi- or tri-pinnate; uppermost pinnæ simply pinnate, with entire, linear-oblong pinnules; the next with numerous pinnatifid pinnules, 2in. to 3in. long, about ⅜in. broad, in opposite pairs, the lowest often quite close to the stem, reduced in size, and their segments dilated; lowest pinnæ often very large and compound. *sori* interrupted or continuous, often reaching the points of the segments. Tropics, &c., 1823. Greenhouse. SYNS. *P. Vespertilionis, Litobrochia Vespertilionis.* In the form *aurita*, the lowest pair of pinnules are quite simple, and closely adpressed to the stem at the base of the pinnæ.

P. Kingiana (King's). A variety of *P. tremula.*

P. Kunzeana (Kunze's). *sti.* 3ft. long, strong, erect, straw-coloured or reddish-brown. *fronds* ample; terminal pinna 1ft. long, 3in. broad, cut down two-thirds of the way to the rachis into numerous linear, falcate, sharp-pointed lobes, which are slightly spinulose-serrate when barren; lateral pinnæ in numerous, nearly

Pteris—*continued.*

opposite pairs, the lower ones stalked, equalling or exceeding the terminal one and similarly pinnatipartite; lowest pair of pinnæ large, deltoid, compound below, with smaller, similar pinnules. *sori* falling short of the tips of the segments. Tropical America. (H. S. F. 139.) SYN. *Litobrochia Kunzeana.*

P. laciniata (torn). *sti.* 1ft. or more long, stout, erect, very hairy. *fronds* 2ft. to 4ft. long, 1ft. to 2ft. broad, deltoid, tripinnatifid, the upper part not cut down to the rachis, with oblong, entire lobes, ¼in. to ⅜in. long, ⅜in. broad; lower pinnæ 1ft. to 1½ft. long, 6in. to 9in. broad, with numerous lanceolate pinnules on each side, which are cut down to a broadly-winged rachis into lobes about ½in. long and ¼in. broad; rachis and both surfaces hairy. *sori* lateral in the ultimate lobes, but not reaching the apex. West Indies. (H. S. F. 132B.) *P. Gheisbreghtii* is a less hairy, Mexican variety.

P. leptophylla (slender-fronded).* *sti.* 6in. to 9in. long, erect, firm, straw-coloured. *fronds* 9in. to 12in. each way, deltoid; a few of the upper pinnæ simple, the largest of these under 1in. long, ¼in. broad, decurrent at base, strongly spinulose-serrate when barren; central pinnæ lanceolate, caudate, pinnatifid, with numerous similar pinnules; lowest pinnæ deltoid, with pinnules often 2in. long, and again pinnatifid. *sori* not reaching the tips of the segments. Brazil, 1824. See Fig. 310. (H. G. F. 23.) SYN. *Litobrochia leptophylla.*

Pteris—*continued.*

pinnæ 1ft. long, very compound. *sori* not reaching the points of the segments. New Zealand. A well-marked species. SYN. *Litobrochia macilenta.*

P. macroptera (large-winged). *sti.* 1ft. or more long, naked, erect, straw-coloured or brownish. *fronds* 2ft. or more long, 1ft. to 1½ft. broad, cut nearly to the rachis in the upper part into numerous linear lobes, the lowest of which are 6in. to 9in. long and ½in. broad, with about 1in. between them at the base, the point gradually narrowed and very faintly toothed when barren; lateral pinnæ few, often only a single pair, like the terminal one, but smaller. *sori* not reaching the tips of the segments. Brazil. SYN. *Litobrochia macroptera.*

P. Milneana (Milne's). *sti.* strong, erect, yellowish-brown. *fronds* 2ft. to 3ft. long, with numerous pinnæ on each side, cut down throughout nearly to the rachis into linear-oblong, falcate lobes, ¼in. to ⅜in. long; lowest pinnæ 6in. to 9in. long, 1in. to 1½in. broad, with a single similar, but smaller, pinnule at the base on the lower side. *sori* falling short of the sub-entire tips. Solomon Isles, 1865. SYN. *P. tripartita* var. (H. S. F. 138B).

P. moluccana (Moluccan). *sti.* strong, erect, dark brown. *fronds* 2ft. to 3ft. long, oblong, simply pinnate; pinnæ in numerous, nearly opposite pairs, linear, cuneate at base, spinu-

FIG. 311. PTERIS QUADRIAURITA ARGYRÆA.

P. longifolia (long-fronded).* *sti.* 6in. to 12in. long, stout, erect, pale, scaly below. *fronds* 1ft. to 2ft. long, 4in. to 9in. broad, oblong-lanceolate, attenuated below; pinnæ sessile, often twenty to thirty on each side, 3in. to 6in. long, ⅛in. to ⅜in. broad, linear, entire, truncate or cordate, or sometimes slightly auricled at base; rachis sometimes scaly. Involucres yellowish-brown, membranous. Tropics, 1770.

P. longipes (long-stalked). *sti.* 1ft. to 2ft. long, erect, straw-coloured. *fronds* tripartite; terminal pinna about 6in. long, 1in. broad, with numerous erecto-patent, linear-oblong lobes, which are cut nearly to the rachis; lateral pinnæ numerous on each side, not more than 1in. apart, the longest simple one about 6in. long, the lowest compound, sometimes nearly as large as the central portion of the frond, 1ft. long, 6in. broad. *sori* falling short of the tips of the segments. India. SYN. *P. pellucens.*

P. macilenta (thin). *sti.* 6in. to 12in. long, straw-coloured, brownish below. *fronds* 1ft. to 3ft. long; terminal pinna 4in. to 8in. long, cut down nearly to the rachis into several deeply-sinuated and toothed, oblong lobes on each side; lateral pinnæ numerous, the upper ones 2in. apart at the base, cut down to the rachis below into deeply-lobed, deltoid pinnules; lower lose-serrate towards the point, the largest 1ft. to 1½ft. long, ⅜in. to ⅝in. broad. Involucres narrow, membranous. Malayan and Solomon Isles, 1880. (H. S. F. 112B.)

P. mutilata (mutilated). *sti.* slender, erect, bright brown or straw-coloured, those of the fertile frond longest (9in. to 12in.) and strongest. *fronds* about 6in. each way, deltoid, with a linear, entire point, several entire pinnæ, but the lowest pair lanceolate-deltoid, 4in. to 6in. long, 3in. to 4in. broad, with several linear, erecto-patent pinnules on each side; divisions of the barren frond shorter and broader than those of the fertile one, not serrated, but mucronate at the point, and cartilaginously bordered. Involucres narrow, membranous. West Indies. (H. S. F. 131A.) *P. concinna* is, according to Mr. Baker, a more compound form than usual.

P. nemoralis (grove-loving). A form of *P. biaurita.*

P. paleacea (scaly). *sti.* 2ft. to 4ft. long, strong, erect, reddish-brown or straw-coloured, brown-scaly, becoming muricated. *fronds* 1ft. or more each way; terminal pinna 6in. to 9in. long, 1½in. broad, consisting of numerous contiguous, falcate, linear lobes, 1in. or more long, blunt, not serrated; lateral pinnæ similar, closely placed (not 1in. apart at base), imbricated, the

Pteris—*continued.*

lowest with several large similar pinnules from the under side; rachises scaly. *sori* extending along the whole length of the edge. St. Helena.

P. palmata (hand-shaped).* *sti.* 1ft. or more long, erect, chestnut-brown. *fronds* 4in. to 9in. each way; barren ones with a broad, undivided centre, and five or more triangular lobes, of which the terminal one is the largest, the lowest deflexed, and the sinuses rounded; fertile fronds cut down to a broadly-winged centre into linear lobes, of which the upper ones are entire, and the lower ones again cut on the lower side, the longest entire ones 3in. to 4in. long, ¼in. to ⅜in. broad; costæ black. *sori* continued to the tips of the segments. Tropical America, 1821. (H. G. F. 22.) SYNS. *P. collina, Doryopteris palmata.*

P. patens (spreading).* *sti.* 1ft. or more long, erect, chestnut-brown. *fronds* 3ft. to 4ft. long, 2ft. or more broad; terminal pinna 6in. to 9in. long, 1½in. to 2in. broad, with several narrow-linear lobes on each side, which are widened suddenly on both sides within a short distance of the base, the barren ones slightly serrated; lateral pinnæ numerous, similar, but larger, sometimes 1½ft. long, 2in. broad, the lowest forked. *sori* continued nearly to the ends of the segments. Ceylon, &c. (H. S. F. 137.) SYN. *P. decussata.*

P. pedata (footed).* *sti.* blackish, those of the barren fronds 3in. to 4in. long. *fronds*, barren ones 1in. to 2in. each way, with an almost entire, triangular apex, and a bluntly-divided, lateral lobe on each side; fertile ones 4in. to 6in. each way, cut nearly to the rachis into several pinnæ on each side, of which the upper ones are linear and entire, 1in. to 1½in. long, the lowest pair much larger than the others, and with several pinnules on the under side, the lowest of which are again pinnatifid; costæ dark-coloured. *sori* reaching the tips of the segments. Tropical America. (B. M. 3247.) SYN. *Doryopteris pedata.*

P. pellucens (pellucid). A synonym of *P. longipes.*

P. podophylla (duck's-foot-fronded). *sti.* 4ft. or more long, ¼in. to ⅜in. thick at base, muricated below, straw-coloured. *fronds* ample, ternately divided; terminal pinna 6in. or more long, 1in. to 1½in. broad, cut two-thirds of the way to the rachis into numerous linear-oblong, falcate lobes, which are finely spinulose-serrate when barren; lateral pinnæ in numerous, closely-placed, nearly opposite pairs, 6in. to 9in. long, 1in. to 1½in. broad, with numerous lobes similar to those of the terminal one; lateral divisions of the frond like the terminal one, but smaller. *sori* continuous, falling short of the tips of the segments. West Indies, &c. (H. G. F. 55.) SYN. *Litobrochia podophylla.*

P. pungens (prickly). *sti.* 1ft. or more long, pale or brownish, prickly. *fronds* 1ft. to 2ft. long, 1ft. to 1½ft. broad; terminal pinna sometimes 1ft. long, upwards of 2in. broad, with a long, entire point, and numerous close, parallel, linear-oblong lobes, 1in. to 1½in. long, which extend nearly to the rachis, and are finely toothed towards the point when barren; lateral pinnæ similar to the terminal one, the lowest 2in. to 3in. below the next above it, once-forked, with a smaller, similar pinnule. *sori* not reaching the apices of the segments. West Indies. If the muricated stipe be not of a permanent character, this cannot, according to Mr. Baker, be regarded as distinct from *P. quadriaurita.*

P. pyrophylla (Pyrus-fronded). A form of *P. quadriaurita.*

P. quadriaurita (four-eared).* *sti.* 1ft. to 2ft. long, strong, erect, straw-coloured or brownish. *fronds* 6in. to 3ft. long, 4in. to 12in. or more broad; terminal pinna cut nearly to the rachis into numerous close, parallel, linear-oblong lobes, ¼in. to 1in. long, the barren ones entire or slightly serrated; lateral pinnæ 6in. to 12in. or more long, 1in. to 2in. broad, the lowest 1in. to 2in. apart at the base, usually again compound, with one or two similar, but smaller, pinnules branching from them at the base on the lower side. *sori* often continuous along the whole margin of the segments. Tropics. The following are regarded, by Mr. Baker, as mere forms of this species: *P. argyræa*, a variety with a more or less distinctly marked band of white down the centre of the frond (see Fig. 311); *P. felosma, P. pyrophylla, P. sulcata.*

P. q. tricolor (three-coloured). A synonym of *P. aspericaulis tricolor.*

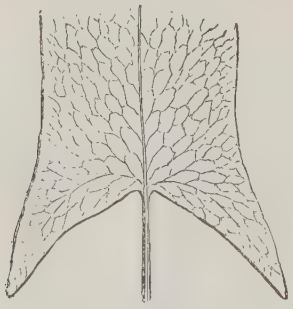


FIG. 312. LOWER PORTION OF FROND OF PTERIS SAGITTIFOLIA.

Pteris—*continued.*

P. sagittata (arrow-shaped). This name is applied to a form of *Pellæa cordata.*

P. sagittifolia (arrow-fronded).* *sti.* 4in. to 6in. long, erect, blackish. *fronds* 4in. to 6in. long, 2in. to 3in. broad, hastate-lanceolate or sub-triangular, the basal lobes triangular, acuminate, directed downwards, the margins entire, midrib blackish. *sori* continued all round the margin. Venezuela to Brazil. See Fig. 312. (H. E. F. 39.) SYN. *Doryopteris sagittifolia.*

FIG. 313. PINNA OF PTERIS SCABERULA.

P. scaberula (slightly scabrous).* *rhiz.* wide-creeping. *sti.* 6in. to 12in. long, strong, flexuous, bright reddish-brown, scabrous. *fronds* 1ft. to 1½ft. long, 6in. to 9in. broad, lanceolate or ovate-lanceolate, tri- or quadri-pinnatifid; lower pinnæ lanceolate-deltoid, 4in. to 9in. long, cut down to the rachis into numerous lanceolate pinnules on each side, which are again cut down into oblong, toothed segments, about ¼in. long. *sori* copious, when mature occupying nearly the whole segment, except the midrib. New Zealand. Greenhouse. See Fig. 313. (H. S. F. 93A.)

FIG. 314. LOWEST PINNA OF PTERIS SEMIPINNATA.

Pteris—*continued.*

P. semipinnata (half-pinnate). *sti.* 1ft. or more long, strong, erect, bright chestnut-brown. *fronds* 1ft. to 1½ft. long, 6in. to 9in. broad, ovate-lanceolate; upper part cut nearly to the rachis into numerous close, entire, linear lobes, the lowest of which are 1½in. to 3in. long; lower two-thirds of the frond with six or eight pairs of opposite, distantly-placed pinnæ, the largest of which are 3in. to 6in. long, with a long, linear, entire point, and a broad, entire wing on the upper side of the rachis, but the lower side with several linear pinnules, 1in. to 2in. long. Involucres membranous. East Indies, &c. See Fig. 314. (H. G. F. 59.)

P. serrulata (saw-edged).* Spider Fern. *sti.* 6in. to 9in. long, erect, wiry, pale or brownish. *fronds* 9in. to 18in. long, 6in. to 9in. broad, ovate, bipinnatifid; main rachis margined with a wing, which gradually narrows downwards; pinnæ in six or more distant, opposite pairs, the upper ones simple, often 4in. to 6in. long, ⅛in. to ¼in. broad, the lower ones with several long-linear, erecto-patent pinnules on each side, the edges of the barren ones spinulose-serrulate. Involucres narrow-membranous. China, 1770. Greenhouse. The following varieties of this species are enumerated by Mr. B. S. Williams:

P. s. angustata (narrow). An elegant form, with pinnæ very much narrower than in the type, and crested at each point.

P. s. Applebyana (Appleby's). A superb garden variety; pinnæ long and narrow, pendent, furnished with a much-divided and fringed tassel at all the points.

P s. corymbifera (corymb-bearing). This handsome variety is also of garden origin. It has erect fronds, with much-shortened pinnæ, forming dense, crisp, corymbiferous heads.

P. s. cristata (crested). An erect garden form, with the apex of each pinna beautifully crested.

P. s. c. semi-fastigiata (slightly fastigiate). The finest variety of all; it has a compact, dense habit, and forms a very large and broad-crested corymb at the apex; the lower portion of the frond is developed as in the normal form.

P. s. polydactyla (many-fingered). In this variety, the points of the pinnæ are several times forked or fingered, and frequently much lengthened out.

FIG. 315. PTERIS SERRULATA TENUIFOLIA, showing Habit and Portion of detached Frond.

P. s. tenuifolia (slender-fronded). A form with narrow pinnæ. See Fig. 315.

P. spinulifera (spine-bearing). A synonym of *P. atrovirens.*

P. Stelleri (Steller's). A synonym of *Pellæa gracilis.*

P straminea (straw-coloured). *sti.* 1ft. to 1½ft. long, and, as well as the rachis, stramineous. *fronds* narrow-deltoid, 1ft. to 1½ft. long; pinnæ ascending, the lowest much the largest, deltoid, with compound lower pinnules on both sides, the others lanceolate, 1½in. to 2in. broad, cut down to the rachis or a narrow wing; segments lanceolate, narrowed to a point, the sterile ones sharply and closely dentate, upper ones growing gradually shorter. *sori* falling short of the tips of the segments. Chili. SYN. *P. crispa* (of gardens).

P. sulcata (furrowed). A form of *P. quadriaurita.*

P. tremula (trembling).* *sti.* 1ft. or more long, strong, erect, bright chestnut-brown. *fronds* 2ft. to 4ft. long, 6in. to 2ft. broad, the apex with a few, closely-placed, linear, entire lobes, which are obliquely decurrent at the base, the largest hardly more than 1in. long; upper pinnæ simply pinnate, with numerous similar lobes on both sides, the largest about 6in. long, above 1in. broad; lower pinnæ often very compound, sometimes 1ft. long and bipinnate. *sori* copious, sometimes filling up the whole segment except the midrib. Australia and New Zealand, 1820. Greenhouse. See Fig. 316. (H. S. F. 120B.) The variety *Kingiana* has its ultimate segments large, sometimes 1½in. long, nearly ¼in. broad, not toothed.

Pteris—*continued.*

P. tricolor (three-coloured). A synonym of *P. aspericaulis tricolor.*

P. tripartita var. (thrice-parted). A synonym of *P. Milneana*

FIG. 316. PINNA OF PTERIS TREMULA.

P. umbrosa (shady).* *sti.* 1ft. to 1½ft. long, erect, bright reddish-brown. *fronds* 1ft. to 2ft. long, 6in. to 12in. broad, with a terminal pinna and usually six to nine lateral ones, all of which run down the stipe at the base, so as to form a broad wing, which reaches nearly or quite to the next node; upper pinnæ 3in. to 6in. long, ¼in. to ½in. broad, finely serrated in the sterile portions; lower ones forked, or with two or four erecto-patent, linear pinnules. Australia, 1823. Greenhouse. (H. S. F. 130B.)

P. undulata (waved). A variety of *P. comans.*

P. Vespertilionis (bat-winged). A synonym of *P. incisa.*

P. vittata (striped). A variety of *P. grandifolia.*

PTERIUM. A synonym of *Lamarckia.*

PTEROCARPUS (from *pteron*, a wing, and *karpos*, a fruit; the pods are girded by a broad wing). ORD. *Leguminosæ.* A genus comprising about fifteen species of unarmed, stove trees, inhabiting the tropical parts of Asia, Africa, and America. Flowers yellow, rarely mixed with violet and white, often showy, disposed in simple or paniculate, loose, axillary or terminal racemes; calyx turbinate at base; standard orbicular or broadly ovate; wings oblique, obovate or oblong; petals glabrous. Pods compressed, indehiscent, orbiculate or ovate, rarely oval-oblong. Leaves alternate, impari-pinnate; leaflets alternate or irregularly opposite, exstipellate. For culture of the under-mentioned species, *see* **Dalbergia.**

P. dalbergioides (Dalbergia-like). A synonym of *P. indicus.*

P. Draco (dragon). Dragon Gum-tree. *fl.* yellow, in paniculate racemes; panicles short, loose. May. Pods 1½in. in diameter. *l.*, leaflets 2in. to 4in. long, ovate or oblong, acuminate, shining. *h.* 30ft. Tropical America, 1820.

Pterocarpus—*continued.*

P. flavus (yellow). A form of *P. indicus.*

P. indicus (Indian). Burmese Rosewood. *fl.* yellowish; racemes axillary, simple or branched. May. Pods acutely mucronate. *l.*, leaflets from five to nine, alternate, acute, glabrous. *h.* 30ft. East Indies, 1813. (B. F. S. 23.) SYN. *P. dalbergioides. P. flavus* is regarded, by Bentham, as merely a form of this species.

P. Marsupium (pouched). *fl.* pale yellow, disposed in terminal panicles. April. *l.*, leaflets from five to seven, alternate, elliptic, somewhat emarginate, coriaceous, glabrous. *h.* 40ft. Coromandel, 1811. (B. F. S. 21; B. M. Pl. 81.)

P. Rohrii (Rohr's). *fl.* yellow, in simple or slightly-branched, tomentose racemes; pedicels shorter than the calyx. April. Pods sub-orbiculate, about 2in. in diameter. *l.*, leaflets very variable, five to nine, ovate or oblong, acuminate, glabrous, 3in. to 5in. long. *h.* 20ft. Tropical America, 1816.

PTEROCARYA (from *pteron*, a wing, and *caryon*, a nut; referring to the winged fruit). ORD. *Juglandeæ.* A small genus (three or four species) of hardy, deciduous trees, natives of temperate Asia. Flowers unisexual, monœcious, in long, pendulous spikes. Fruit drupaceous, dry, angled, having two wings as the ovary, much tapered at the tip, not opening. Leaves ample; leaflets often numerous, narrow. The species are seldom seen in gardens. They thrive best when planted near water; in such spots, *P. fraxinifolia* makes one of the most ornamental of deciduous trees. All the species are easily raised from seed, imported or ripened in this country.

P. caucasica (Caucasian). A synonym of *P. fraxinifolia.*

P. fraxinifolia (Ash-leaved).* Caucasian Walnut. *fl.* greenish. May. *l.*, leaflets about nineteen, ovate-oblong, acuminate, acutely serrate, glabrous. *h.* 20ft. to 40ft. Caucasus (in moist woods), 1800. SYN. *P. caucasica.*

P. rhoifolia (Rhœas-leaved). *fl.*, female catkins sub-terminal, loose-flowered, equalling or exceeding the leaves. *l.* eight or nine-jugate; leaflets sessile, rounded from the base, oblong-lanceolate, acuminate, argutely and densely serrulated, glabrous above, softly pubescent on the veins beneath, as well as on the petioles. Japan. (S. Z. F. J. 150.)

P. stenoptera (narrow-winged). *fl.*, females sessile; bracts minute, acute; wings linear-oblong, attenuated at apex. *l.* five-jugate, with a rudimentary odd leaflet; leaflets sessile, elliptic lanceolate, attenuated at base, obtuse at apex, serrated on the margins. China.

PTEROCEPHALUS. Included under **Scabiosa** (which *see*).

PTEROCHILUS. A synonym of **Microstylis** (which *see*).

PTEROCOCCUS. A synonym of **Calligonum** (which *see*).

PTERODISCUS (from *pteron*, a wing, and *discus*, a disk; referring to the broad wings of the disk of the fruit). ORD. *Pedalineæ.* A genus consisting of only three species of greenhouse, herbaceous plants, with tuberous roots, or with a thick, succulent stem, which becomes tall under cultivation; two are natives of South Africa, and the third is Angolan. Flowers purple or lurid-yellow, solitary in the axils, very shortly stalked or almost sessile; calyx small, five-parted; corolla tube gibbous at base, swollen upwards; limb somewhat bilabiate, with five broadly rotundate, spreading lobes. Leaves opposite or alternate, narrow, toothed or cut, rather thick, canescent. The only species worth growing is *P. speciosus.* This is a handsome plant, and thrives best under the influence of a full exposure to sunlight. It requires a compost of sandy loam and leaf mould. Propagated by seeds, sown in spring and autumn; and by dividing the plant, in spring. *P. luridus* requires similar treatment.

P. luridus (lurid). *fl.* dull yellow, tubular. July. *l.* linear-oblong, deeply lobed, almost pinnatifid. *h.* 1½ft. South Africa, 1868. A gouty-stemmed plant, of little horticultural value. (B. M. 5784.)

P. speciosus (showy).* *fl.* of a beautiful lilac or reddish colour, axillary, solitary, large, with a funnel-shaped tube, and a spreading, five-lobed limb. May. *l.* opposite, sinuate, dentate. Stem branching into several erect, thick branches. Roots large, globose, tuberous, the upper part elevated above the earth. *h.* 2ft. South Africa, 1848. (B. M. 4117.)

PTEROLOBIUM (from *pteron*, a wing, and *lobos*, a pod; the pods are produced into a wing at the extremity). SYNS. *Quartinia, Reichardia.* ORD. *Leguminosæ.* A genus comprising four species of tall, climbing, stove shrubs, armed with recurved prickles; they are natives of tropical Asia, Africa, and Australia. Flowers white (or yellowish?), small, racemose; racemes at the tips of the branches, loosely paniculate; calyx segments five, imbricated; petals five, spreading, imbricated. Pods sessile, compressed, samaroid, indehiscent, the apex produced into an oblique, oblong or falcate wing. Leaves bipinnate; leaflets small, numerous; stipules small or inconspicuous; bracts very caducous. *P. indicum*—the only species introduced—requires culture similar to **Cæsalpinia** (which *see*).

P. indicum (Indian). *fl.* yellowish, axillary only from the extreme leaves, which gives them an appearance of a large, terminal, leafy panicle. *l.* alternate, abruptly bipinnate, 5in. to 6in. long, 3in. broad; pinnæ opposite, four to eight pairs, oval, entire, smooth, ½in. long, ¼in. broad; petioles armed with three prickles. East Indies. SYN. *Cæsalpinia lacerans.*

PTEROLOMA. Included under **Desmodium** (which *see*).

PTERONEURUM (from *pteron*, a wing, and *neuron*, a nerve; referring to the winged placentas). ORD. *Cruciferæ.* A small genus of rock plants, included, by the authors of the "Genera Plantarum," under **Cardamine** (which *see* for culture of the species described below).

P. carnosum (fleshy). *fl.*, calyx spreading; corolla twice as long as the calyx; petals white, obovate. June. *l.*, segments ovate, sub-emarginate, glaucescent. *h.* 3in. Eastern Europe, &c., 1824. Hardy perennial.

PTEROPHYLLUS. A synonym of **Ginkgo** (which *see*).

PTEROPHYTON. A synonym of *Actinomeris.*

PTEROPSIS. Included under **Tænitis** (which *see*).

PTEROSPERMUM (from *pteron*, a wing, and *sperma*, a seed; referring to the seeds being winged). SYN. *Velaga.* ORD. *Sterculiaceæ.* A genus comprising about fourteen species of stove, scaly or stellate-tomentose trees or shrubs, natives of tropical Asia. Flowers often elongated, sometimes several inches long; calyx tubular, five-cut or parted, deciduous; petals five, obovate, oblong, or linear, deciduous; peduncles axillary, short, one or few-flowered. Leaves coriaceous, often oblique, entire or the uppermost ones angularly toothed, penninerved, and three to seven-nerved at the base. The species best known to cultivation are those described below. They thrive in a compost of sandy, fibry loam and lumpy peat; and perfect drainage is most essential. Propagated by cuttings of half-ripened side shoots, cut close to the stem, and inserted in sand, in bottom heat.

P. acerifolium (Maple-leaved). *fl.* white; pedicels shorter than the petioles. July to September. *l.* broad, peltately-cordate, obtuse, with a short acumen, toothed, tomentose beneath, upper surface white, clothed with stellate hairs. East Indies, 1790. A large tree. This species thrives well under greenhouse treatment. (B. M. 620.)

P. suberifolium (Cork-tree-leaved). *fl.* white, axillary, solitary, twin or tern at the tops of the branches; pedicels hardly the length of the petioles, crowded. *l.* oblong, acuminate, obliquely cordate at the base, coarsely toothed at the apex, tomentose beneath. East Indies, 1783. A small tree. (B. M. 1526.) SYN. *Pentapetes suberifolia.*

PTEROSTELMA. Included under **Hoya** (which *see*).

PTEROSTYLIS (from *pteron*, a wing, and *stylis*, a column; alluding to the broadly-winged column). SYN. *Diplodium.* ORD. *Orchideæ.* A genus comprising about three dozen species of greenhouse, terrestrial orchids, with small, underground tubers; six are confined to New Zealand, and the rest are all Australian, one being also found in New Zealand and another in New Caledonia. Flowers usually green, often tinged or streaked with red or brown, large and solitary, or smaller and racemose, on short pedicels; dorsal sepal broad, erect, in-

Pterostylis—*continued.*

curved, and very concave; petals lanceolate-falcate, curved under the dorsal sepal, and forming with it an arched or almost hood-shaped upper lip or helmet; lateral sepals more or less united in a two-lobed lower lip, the lobes often terminating in long points; lip on a short claw at the end of the basal projection of the column; column elongated within the galea, and curved with it. Radical leaves ovate, tufted; cauline ones linear or lanceolate, or reduced to sheathing scales. The under-mentioned species, which are those best known to gardeners, thrive in leaf mould, lightened by the admixture of a little sand. Before putting in the soil, the pots should be one-third filled with broken crocks. Propagated by divisions. Except where otherwise stated, all the species here described are Australian.

P. acuminata (taper-pointed). *fl.* green; galea 1in. to 1¼in. long, usually produced into a point; lip oblong-linear, tapering to a point; scape one-flowered, 6in. to 9in. high. April. *l.* in a radical rosette, ovate or broadly elliptical, and five or seven-nerved. *h.* 6in. 1827. (B. M. 3401; F. A. O., Part 5.)

P. Banksii (Banks'). *fl.* green, solitary, 2in. to 3in. long; upper sepal arched forward, the lateral ones produced into long, slender tails; lip linear, the tip exserted. April. *l.* numerous, alternate, sheathing the whole stem, rising above the flower, narrow linear-lanceolate, acuminate. *h.* 6in. to 18in. New Zealand, 1832. (B. M. 3172.)

P. Baptistii (Baptist's).* *fl.* green, marked with white and brown, solitary, and adorned with two bristle-like antennæ. Winter. *l.* rosulate, basilar, petiolate, oblong-cuneate, the upper ones ascending the rachis. *h.* 1ft. 1877. (B. M. 6351; G. C. n. s., ix. 213.)

P. curta (short-lipped). *fl.* green; galea erect, about 1¼in. long, acute, but not acuminate, the lower lip cuneate, with two broadly-lanceolate lobes; lip linear, rather longer than the column; scapes one-flowered, usually about 6in. high. October. *l.* in a radical rosette, usually on long petioles, ovate or broadly elliptical, five to nine-nerved, from under 1in. to 1½in. long. 1829. (B. M. 3086; F. A. O., Part 5.)

P. nutans (nodding). *fl.* green; galea nearly 1in. long, much curved near the base, and again towards the end, so as to give the flower a nodding appearance, the lower lip shortly and broadly cuneate; lip oblong-linear, obtuse, sometimes minutely ciliated; scape one-flowered, 6in. to 12in. high. September. *l.* in a radical rosette, petiolate, ovate or elliptical, ½in. to 1½in. long. 1826. (B. M. 3085.)

PTEROSTYRAX. A synonym of **Halesia** (which *see*).

PTEROTA. A synonym of **Zanthoxylum** (which *see*).

PTEROZONIUM. Included under *Gymnogramme.*

PTERYGOCALYX. A synonym of *Crawfurdia.*

PTERYGODIUM (from *pterygodes*, wing-like; alluding to the appearance of the sepals). Monk's-cowl Orchid. Ord. *Orchideæ.* A genus comprising about half-a-score species of greenhouse, leafy, terrestrial, South African orchids. Flowers spicate, few or solitary; dorsal sepal connivent with the petals, and more or less coherent; lip adnate to the base of the column, and furnished with a large, tongue-formed appendage at its base. Probably none of the species are now in cultivation.

PTILOCNEMA. A synonym of **Pholidota** (which *see*).

PTILOMERIS (from *ptilon*, a feather, and *meris*, a part; alluding to the fringed, chaffy scales of some of the species). Syn. *Hymenoxys.* Ord. *Compositæ.* A small genus (about three species) of hardy, annual, Californian herbs, regarded, by Bentham and Hooker, as synonymous with *Actinolepis.* Flower-heads yellow, pedunculate at the tips of the branches; ray florets in one series, ligulate, two or three-toothed; involucral bracts one-seriate; receptacle convex or conical, naked or very slightly bristly; achenes linear. Leaves opposite, or the upper ones rarely nearly all opposite, remotely toothed, incised, or once or twice pinnatifid. *P. coronaria*, the only species calling for mention here, may be treated as other hardy annuals.

Ptilomeris—*continued.*

P. coronaria (crowned). *fl.-heads*, ray florets oblong; involucral scales lanceolate; receptacle pilose. June. *l.* mostly opposite, the divisions capillary. *h.* 1ft. 1838. Plant branched from the base, minutely puberulent. Syn. *Hymenoxys californica* (B. M. 3828).

PTILOTRICHUM. Included under *Alyssum.*

PTYCHOSPERMA (from *ptyche*, a fold or winding, and *sperma*, a seed; referring to the ruminated albumen). Australian Feather-palm. Syn. *Seaforthia.* Ord. *Palmæ.* A genus of elegant, unarmed, stove palms, usually with tall trunks. About a dozen species have been enumerated, natives of tropical Australia, New Guinea, and the Pacific Islands. Flowers usually rather small; complete spathes two, caducous; spadix with spreading, often slender, branches. Fruit ovoid or ellipsoid, sometimes beaked, terete or sulcate, one-seeded, the albumen more or less ruminated. Leaves terminal, equally pinnatisect; segments thickened on the margins, præmorse, the terminal one confluent; sheaths elongated. The species thrive best in fibrous loam, leaf mould, and sand. Thorough drainage, and an abundant supply of water, are important points in their culture. Propagated by seeds.

P. Alexandræ (Alexandra's). *l.* pinnate, beautifully arched, quite red when young, but light green when mature; rachis smooth. Stems rather slender. *h.* 70ft. to 80ft. Queensland, 1870. A very elegant species, rare in cultivation. (F. d. S. 1916.) *Archontophœnix Alexandræ* is now the proper name of this plant.

Fig. 317. Ptychosperma Cunninghamiana.

P. Cunninghamiana (Cunningham's).* Illawarra Palm. *l.* 2ft. to 10ft. long; pinnæ lanceolate, narrow, unequally bifid at the

Ptychosperma—*continued.*

apex, 1ft. to 1½ft. long, dark green; petioles broadly sheathing at the base. Stem somewhat stout, straight. *h.* about 60ft. Queensland and New South Wales. A very elegant species, and a most useful conservatory or cool greenhouse plant. See Fig. 317. SYNS. *Archontophœnix Cunninghamiana* (this name is the correct one), *Seaforthia elegans* (B. M. 4961).

P. Kuhlii (Kuhl's). A synonym of *Pinanga Kuhlii.*

P. Macarthurii (MacArthur's). *l.* pinnate; leaflets arching, linear-oblong, truncate or oblique, and unequally toothed at apex, 4in. to 8in. long. New Guinea, 1879. An elegant and distinct palm. SYN. *Kentia Macarthurii.*

P. Normanbyi (Normanby's). *fl.*, inflorescence ovoid, axillary. *fr.* ovoid, with a conical tip, about 1½in. long. *l.* 8ft. to 10ft. long. *h.* 40ft. to 60ft. Australia. SYNS. *Areca Normanbyi, Cocos Normanbyi.*

P. Rumphii (Rumph's). A synonym of *Drymophloeus olivæformis.*

P. rupicola (rock-loving). A synonym of *Loxococcus rupicola.*

P. Seemanii (Seeman's).* *l.* pinnate; pinnæ erose-dentate, somewhat resembling those of a *Caryota* in appearance, and of a bright green colour. Stem, when fully developed, about 1in. in diameter, strong. Fiji Islands, 1879. An elegant, dwarf-growing species.

PUBERULOUS. Minutely pubescent.

PUBESCENT. Softly downy or hairy.

PUCCINIA (named after an Italian botanist, Puccini). A large genus of parasitic Fungi belonging to the order *Uredineæ.* In this order, the Fungi grow, with a doubtful exception or two, on living plants, into which they push their jointed mycelium. The reproduction is always effected by conidia, or spores, produced on branches from the mycelium, and never inclosed in larger cells, as in **Mould** or in **Pyrenomycetes** (which *see*). The conidia are usually crowded together in masses, which, for a time, are protected by the epidermis of the host-plant; but this generally becomes torn, and the conidia are exposed. The conidia are known to be of two, or even more, forms in almost all the species in the order, and these forms are usually very different from one another, affording very striking examples of the phenomenon called "pleomorphism." So different are they, that several genera were established on what are now known to be only forms of the same Fungi as had already received names under other forms; hence, much confusion has arisen, and this is only gradually being overcome by careful and exact observations. Even yet much doubt exists as to the true relationships of many of the species. An attempt will be made to render this part of the subject more clear by describing what is now generally accepted as the life-history of two or three of the more important species of the genus *Puccinia.* The various forms of conidia alternate with one another in the cycle of development of each species, and experiments have led to the belief that some species of *Puccinia* live on different host-plants in the different stages of the cycle.

The forms of reproductive organs met with in the most complete cycles in the genus, *e.g.*, that believed to exist in *P. graminis*, are three or four in number. The names employed to denote them were formerly given to them when they were regarded as different species, belonging to genera distinct from that now recognised as the more mature condition (viz., *Puccinia*). The forms are as follows:

1. The *Æcidium* (old generic name), or Cluster-cup, in the form of a cup, at first closed, afterwards open above. The sides of the cup (peridium) consist of a single layer of cells. The hollow is filled with closely-packed, erect branches, arising from the mycelium, each of which bears a chain or row of rounded, or angular, thin-walled, yellow cells, which separate from one another, and germinate readily, pushing out a mycelium thread. On a leaf of the host-plant, the mycelium pushes through a stoma, and produces the Fungus anew. The Cluster-cups usually stand, as the name denotes, in clusters, on thickened, discoloured tissues of the hosts, though, occasionally, they are scattered over the green parts without causing much discoloration. They generally stand on young stems and on the lower surface of leaves (see

Puccinia—*continued.*

FIG. 318. LEAVES OF BERBERIS VULGARIS COVERED WITH ÆCIDIUM BERBERIDIS (believed to be a stage in the development of *Puccinia graminis*)—*a*, Æcidium-patch on Leaf.

Fig. 318), but may be on the upper surface also. On the same mass of tissue as the cups, but, in general, on the other side of the leaf, small, flask-shaped spaces

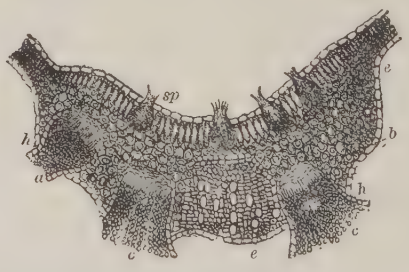


FIG. 319. TRANSVERSE SECTION OF LEAF OF BERBERIS VULGARIS, showing Spermogonia and *Æcidium Berberidis*, magnified considerably—*a*, Æcidium Cup just opened; *b*, Thickened Tissue of Leaf; *c*, *c*, Æcidium Cups fully opened, with Spores dropping out; *e*, *e*, Skin of Leaf; *h*, *h*, Outer Coat of Æcidium Cups; *sp*, Spermogonia.

(spermogonia) open by narrow mouths (see Fig. 319). They are lined with branches of mycelium, bearing extremely small, rod-like bodies (spermatia), which do not seem to act as spores, and whose use to the Fungus is doubtful.

2. The *Uredo* (old generic name), is often developed on the same mycelium as the former, but later; it may grow only on a different host-plant. The uredospores are not inclosed in a cup, or peridium, but are formed on the surface of convex masses of mycelium. These masses are usually covered and protected by the epidermis of the host-plant till the spores are ripe, when the epidermis bursts. The spores are produced singly on erect branches (see Fig. 320), and, when ripe, fall off, and then are hardly to be distinguished from

Puccinia—*continued.*

æcidiospores. Like the latter, they germinate almost at once, and push their mycelium into the tissues of the host-plant through the stomata.

3. The *Teleutospore* (from *teleutaia*, final, and *spora*; so called because it is the final form in the cycle) is sometimes called the *Pucciniospore*; but this name is less suitable, as other genera besides *Puccinia* produce such spores. These are, in most cases, produced on the same substratum as the uredospores, but later in the season;

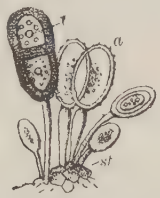


FIG. 320. GROUP OF SPORES OF PUCCINIA GRAMINIS—*a*, Uredospores, formed in early summer; *t*, Teleutospore, formed later in the season; *st*, Stalks supporting the Spores.

and they are most often developed only in late summer. They grow on erect footstalks or branches, to which they usually remain long united, and they are considerably thicker-walled and darker than the others, from which also they differ in form (see Fig. 320). They may be one-celled (*Uromyces*), two-celled (*Puccinia* and *Gymnosporangium*), or three- or more-celled (*Triphragmium* and *Phragmidium*). The teleutospores, for the most part, remain for a considerable time without germinating, often continuing unchanged all winter. On germinating

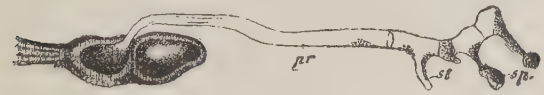


FIG. 321. PUCCINIA GRAMINIS—Teleutospore germinating and producing Sporidia (*sp*) on tips of small stalks (*st*); *pr*, Mycelium Tube growing out of the Spore.

(see Fig. 321), a mycelium tube is pushed out from each cell, or only from one. These tubes often become divided near the tip, by cross walls, into a row of cells, from each of which a small branch arises, and bears, at its tip, a small, rounded or oval body, called a sporidium. The sporidia produce a new mycelium, which penetrates into suitable host-plants, and frequently gives rise to æcidia in them. Occasionally, two forms of teleutospores occur in the same Fungus, *e.g.*, one-celled and two-celled in *Puccinia mixta*. In most of the species, the cycle is not so complete as the above; and, in fact, it has been traced, as yet, in but few species. As has already been said, most cryptogamic botanists believe that some of the species live, during part of the cycle, on one food-plant, and during the other part on another. Such species are said to be heterœcious (from *heteros*, different, and *oikos*, a home). Those that live on a single food-plant during the whole cycle are said to be autœcious (from *autos*, the same, and *oikos*).

Puccinia is readily distinguished, in the perfect condition, from other genera of *Uredineæ* by the teleutospores being free from one another and two-celled; or, at least, there are two-celled spores, associated, in a few species, with three- or more-celled abnormal exceptions, or with a one-celled form, much like the teleutospores of the allied genus *Uromyces*. The two-celled spores vary in length of stalks, in forms, and in surface-markings of the cells, &c.; and on these characters we must depend for distinguishing the species. The genus, in the systems in most frequent use on the Continent, is broken up into sections differing from one another in the completeness of the cycle, so far as known, and in other minor peculiarities.

Puccinia—*continued.*

Owing to the parasitic habit of the very numerous species included in the genus, there are few genera of Fungi more directly injurious; and a considerable number grow on and damage garden and field produce. The injurious effects are due, in some cases, to the abstraction of nourishment by the mycelium of the Fungus from the food-cells of the plant, and to the injury done to the epidermis by the spore-masses tearing it off the tissues beneath. These tissues, in consequence, cease to do their part in supplying food to the plant. In a smaller number of cases, the plant is stimulated by the Fungus to a local over-production of diseased cellular tissue. This is peculiarly the case in the æcidium stage, *e.g.*, on Barberry, on Gooseberry, and on Mints. In some cases, plants may suffer extremely, and may even be killed by the Fungi (*e.g.*, *P. Malvacearum* almost extirpated Hollyhocks in many districts a few years ago), or, if not killed, may be much distorted by them; *e.g.*, Mints attacked by the æcidium of *P. Menthæ*, Anemones bearing *P. Anemones*, &c. In many cases, the plants are simply weakened, without marked distortion; *e.g.*, cereals affected badly by the red and black rusts (*P. graminis* and *P. straminis*), and Onions overgrown by *P. mixta*. Some do not seem to injure very greatly the plants affected by them, but this is exceptional. Their growth and distribution are favoured by moisture, which promotes the formation and germination of the spores.

Remedies. As usual with internal parasites, no cure is known for plants, or parts of plants, attacked by these Fungi; hence, remedies must be directed to the prevention of the spread of disease. This is best accomplished by the removal and destruction of the infested structures, where this is possible. Where the attack is very serious, *e.g.*, in the case of Hollyhocks and of Onions, it is good policy to sacrifice the entire crop, if necessary, to preserve that of the following year from infection. As already said, moisture favours the distribution of the Fungi, and the soil should, therefore, be well drained. Lastly, where the hurtful Fungi are believed to be heterœcious, it is well to remove the supposed intermediate host-plant; *e.g.*, in the case of *Puccinia graminis* of cereals and other grasses, which is believed to live on Barberry-bushes as *Æcidium Berberidis*, the Barberries should be removed from the neighbourhood of the fields. Yet too much reliance must not be placed on this method, as these Fungi are known to thrive when restricted to the one food-plant.

In the following enumeration of the species of *Puccinia* falling under the observation of gardeners, those of which only teleutospores are known are first mentioned, and afterwards those of a more complex nature.

1. *P. Buxi* often forms dark, warty spots, in large numbers, on leaves of Box. Teleutospores alone are known. They are brown, smooth, and oblong or club-shaped. The Box does not, as a rule, seriously suffer.

2. *P. Malvacearum* is only too well known to most gardeners, because of its ravages on Hollyhocks, Mallows, and allied plants. For an account of the appearances produced, of the history of the Fungus, and of the injury done by it, *see* **Hollyhock Fungus.** Only teleutospores are known. They are pale brown, smooth, and pointed at both ends. The plants suffering from the growth of this Fungus seldom recover, and often die in a short time.

3. *P. Arenariæ* belongs to the same group, having, so far as is known, only teleutospores; these are pale yellowish-brown, and slender. They form small, brown masses, often in irregularly-concentric groups, on the leaves of Pinks, and of many wild, as well as garden, Caryophyllaceous plants; but, unless the Fungus is very abundant, the host-plant is seldom endangered by its growth.

Puccinia—*continued.*

4. *P. Grossulariæ* is described as having teleutospores of the ordinary type, and also as possessing an æcidium, known as *Æ. Grossulariæ*. The latter is very plentiful in some years, on discoloured spots on leaves and fruits of the Gooseberry, throughout Britain; but the *Puccinia* has not as yet been recorded as British. The relation of the two forms to one another cannot be yet assumed as fully proved. The æcidium does not, in general, do much harm to the leaves and branches; but, when it grows on the fruits, it renders them useless, and thus, in some years, destroys a considerable part of the crop. It causes the formation of thickened, orange-red patches in the parts affected; in these the cups occur. The patches are usually about ¼in. across. The teleutospores are elliptic or clavate, chestnut-brown, and covered with broad, low warts.

5. *P. mixta* has done very serious harm to Chives (*Allium Schœnoprasum*), and other species of *Allium*, including all, or nearly all, the cultivated forms of Onions. It has been observed as hurtful at Shrewsbury, and near Aberdeen. This species of *Puccinia* has spores of three forms present at one time, viz., a uredospore, formerly called *U. Alliorum*, and two forms of teleutospores—viz., one a Puccinia (two-celled), of oblong form; and the other one-celled, formerly known as *Uromyces Alliorum*. Both the latter forms are attached to long stalks, and both are smooth and brown.

6. *P. Menthæ* grows abundantly on the wild species of *Mentha*, and also on the garden Mints, and on various allied *Labiatæ*. This Fungus possesses all the three forms of spores. The æcidium often grows on the young shoots, and causes marked deformities and stoppage of growth in them; generally, it gives rise to long, dark red or purple patches on which the paler cups are scattered. The uredospores and the teleutospores form small masses, either irregularly scattered or in concentric arrangement. The former spores are pale brown, warty, and rounded; the latter are deep brown, and broadly elliptical with rounded ends.

7. *P. Gentianæ*, in 1885, proved very hurtful to *Gentiana acaulis*, in Kew Gardens, forming spots of teleutospores as in *P. Menthæ*. They resemble the spores of the latter species in form, but are smooth. The æcidium has not been observed in England.

The heterœcious species of *Puccinia* are of little importance to gardeners, since they do no harm to garden produce in the strict sense. To the systematic student of this group they are of the greatest interest, because of the many problems connected with their mode of life, and the careful and continued experiments required to permit of referring the various forms to their proper cycles. Much still remains to be done in this group. Several of them are found on grasses in their uredospore and teleutospore stages, but are believed to form their æcidia on other plants, usually on Dicotyledons. Others occur in the two former stages on Sedges (*Carex*), and in the latter on Dicotyledons. *P. graminis*, to which reference has already been made, is a well-known "rust" of cereals and of other grasses; its uredospores, formerly called *Uredo linearis*, being one of the "red rusts," and its teleutospores one of the "black rusts." Its æcidiospores are believed to be *Æcidium Berberidis*, frequently so common, in the form of orange-red patches, on the leaves of Barberries and of *Berberis Aquifolium*, in shrubberies and by roadsides. None of the other heterœcious species grow on garden plants, but mention is here made of one or two of the cycles that are now admitted, by those who accept heterœcism, as proved to occur among *Uredineæ*.

P. rubigo-vera. The uredospores (*Uredo rubigo-vera*) and teleutospores (*P. straminis*) form "rusts" on grasses; the æcidiospores (*Æ. asperifolii*, *Æ. lycopsodis*) live on many species of *Boragineæ*.

Puccinia—*continued.*

P. coronata. The uredospores and teleutospores occur on grasses, the æcidiospores (*Æ. Rhamni*) on species of *Rhamnus*.

P. poarum. The uredospores and teleutospores occur on *Poa annua*, *P. nemoralis*, and *P. pratensis*; the æcidiospores (*Æ. Tussilaginis*) on Coltsfoot (*Tussilago Farfara*).

P. Caricis. The uredospores (*U. Caricis*) and teleutospores (*P. striola*) occur on species of *Carex*; the æcidiospores (*Æ. Urticæ*) on Nettles.

P. silvatica. The uredospores and teleutospores live on certain species of *Carex*, the æcidiospores on Dandelion (*Taraxacum officinalis*).

PUCHA-PAT. A common Indian name for *Pogostemon Patchouli*.

PUDDING BERRIES. The edible fruits of *Cornus canadensis*.

PUERARIA (named in honour of M. M. N. Puerari, a botanical professor at Copenhagen). SYN. *Neustanthus*. ORD. *Leguminosæ*. A genus consisting of ten species of greenhouse, climbing herbs or sub-shrubs, natives of tropical Asia and Japan. Flowers blue or purplish, disposed on elongated, axillary peduncles, or sub-paniculate and fasciculately racemose at the apices of the branches; standard obovate or sub-orbiculate, the auricles inflexed, appendiculate; bracts small or narrow, very caducous. Pods elongated, two-valved. Leaves pinnately trifoliolate; leaflets ample, ovate or rhomboid, entire or sinuately trilobed, stipellate. The only three species introduced are those described below. For culture, *see* **Clitoria.**

P. Thunbergiana (Thunberg's). *fl.*, standard eight to nine lines long, equalling the keel; peduncles elongated, floriferous above the middle. Summer. *l.*, leaflets broadly rhomboid, or the lateral ones broadly and obliquely ovate, acuminate, entire or broadly sinuate-trilobed, often 4in. to 5in. in diameter. Khasia. A tall, greenhouse twiner. A fibre (used for textile purposes) is obtained from the stems, and a starch (largely used as an article of food by the Chinese and Japanese) from the roots, of this species.

P. tuberosa (tuberous). *fl.* bluish, borne on rather rigid peduncles in the upper nodes; pedicels very short; standard almost ½in. long, laterally reflexed. June. Pods 2in. to 3in. long. *l.*, leaflets 6in. to 12in. long, rhomboid or oblique, ovate; stipules ovate, subcordate. *h.* 3ft. India, 1806. Shrubby. SYN. *Hedysarum tuberosum*.

P. Wallichii (Wallich's). *fl.* reddish, borne on elongated, slender peduncles; pedicels slender; standard ¾in. long, the base ending in a short, narrow claw. June. Pods 3in. to 5in. long. *l.*, leaflets oblique, acuminate, entire; stipules lanceolate, very caducous. *h.* 3ft. India, &c., 1826. Shrubby.

PUFF-BALLS. *See* **Lycoperdon.**

PUGIONELLA. A synonym of **Strumaria** (which *see*).

PUGIONIFORM. Dagger-shaped.

PULEGIUM. A synonym of **Mentha** (which *see*).

PULLUS. Dusky-brown or blackish-coloured.

FIG. 322. PULMONARIA MOLLIS, showing Habit and Portion of detached Inflorescence.

PULMONARIA (from *pulmo, pulmonis*, a lung; the spotted leaves were supposed to resemble diseased lungs, and hence, by the "doctrine of signatures," a supposed efficacy in the disease was ascribed to the plants). Lungwort. ORD. *Borragineæ*. A genus comprising four species of hardy, perennial herbs, natives of Europe, and

FIG. 323. UPPER PORTION OF PLANT OF PULMONARIA OFFICINALIS.

mostly Western Asia. Flowers blue or rose-purple, pedicellate, disposed in terminal, bifid cymes; lower ones, or almost all, bracteate; calyx five-fid; corolla funnel-shaped, with a cylindrical tube and five imbricated, broad, obtuse, spreading lobes. Nutlets four, broad, erect. Leaves generally spotted with white; radical ones usually ample, petiolate; cauline ones few, alternate. The species are of easy culture in almost any moderately good garden soil. Propagated by dividing the clumps in early spring. Several species formerly included here are now referred to **Mertensia** (which *see*).

FIG. 324. PULMONARIA SACCHARATA, showing Habit and detached Inflorescence.

P. angustifolia (narrow-leaved).* Blue Cowslip. *fl.* at first pink, but ultimately bright blue; racemes twin, capitate. Spring. *l.* oblong-lanceolate or lanceolate, clothed with soft, down-like hairs. *h.* 1ft. Europe (Britain). (Sy. En. B. 1097.)

P. mollis (soft). *fl.* blue; calyx rather longer than the tube of the corolla. April and May. *l.*, radical ones elliptic-lanceolate

Pulmonaria—*continued.*

or lanceolate, decurrent into the broadly-winged petiole; cauline ones ovate-lanceolate, semi-amplexicaul. *h.* 9in. Europe, Siberia, &c., 1805. See Fig. 322. (B. M. 2422.)

P. officinalis (officinal). Sage of Bethlehem, &c. *fl.* red at first, then violet, terminal. Spring. *l.* scabrous, radical ones ovate-cordate, cauline ones ovate-oblong, sessile, spotted with white. *h.* 1ft. Europe, &c. (Britain). See Fig. 323. (Sy. En. B. 1098.) There is a white-flowered form of this species.

P. saccharata (sugared).* *fl.* pink. June. *l.*, radical ones oval, acuminate at both ends, decurrent at base into the short petioles; cauline ones sessile, ovate-oblong. *h.* 1ft. Europe, 1817. See Fig. 324.

PULSATILLA. *See* **Anemone Pulsatilla.**

PULTENÆA (probably named after Dr. Richard Pulteney, 1730-1801, author of "Historical and Biographical Sketches of the Progress of Botany in England, from its Origin to the Introduction of the Linnæan System," and other works of merit). Including *Euchilus* and *Spadostyles*. ORD. *Leguminosæ*. A genus comprising seventy-five species of ornamental, greenhouse, evergreen shrubs, confined to Australia. Flowers yellow, orange, or mixed with purple, axillary and solitary, or crowded in terminal heads, and surrounded within the floral leaves by imbricated, scarious, brown bracts or enlarged stipules without any lamina; two upper lobes of calyx more or less united into an upper lip; petals on rather long claws; standard nearly orbicular; wings oblong; keel incurved; stamens free. Pods ovate, flat or turgid, two-valved. Leaves opposite or rarely ternately whorled, simple, sometimes flat or with revolute margins, sometimes concave or with incurved margins; stipules linear-lanceolate or setaceous, brown and scarious. Pultenæas succeed best in fibrous peat, to which about one-seventh part of silver sand should be added. They require, like many other hard-wooded Australian plants, firm potting, and very careful watering with soft water. Propagated by imported seeds; and from cuttings, made of the points of shoots when about three parts matured. The latter should be inserted in very sandy peat, covered with a bell glass, placed in an intermediate temperature, and kept well shaded. In the following species, the flowers are yellow, except where otherwise stated.

P. argentea (silvery). A synonym of *P. dentata*.

P. cordata (heart-shaped). A synonym of *P. juniperina latifolia*.

P. daphnoides (Daphne-like). *fl.* shortly pedicellate, in dense, terminal, sessile heads; standard nearly twice as long as the calyx. June and July. *l.* cuneate-oblong, flat, glabrous, nearly 1in. long, ending in a pungent mucrone. *h.* 2ft. to 3ft. 1792. (A. B. R. 98; B. M. 1394; L. B. C. 1143.)

P. d. obcordata (obcordate). *l.* shorter and broader, more truncate, with a more prominent point. (A. B. R. 574, under name of *P. obcordata*.)

P. dentata (toothed). *fl.* in dense, terminal heads, sessile within the last leaves; calyx silky-villous, half as long as the standard. June. *l.* linear, linear-oblong, or narrow-lanceolate, usually narrow at both ends, ¼in. to ½in. long, darker-coloured or silvery beneath. *h.* 2ft. 1820. SYN. *P. argentea*.

P. euchila (beautiful-lipped). *fl.* axillary, on pedicels ¼in. long; petals half as long again as the calyx. May. *l.* linear-cuneate, obtuse, ¼in. to ¾in. long, flat or slightly concave, dark or silvery beneath. *h.* 1ft. 1824. SYN. *Spadostyles Sieberi*.

P. flexilis (bending). *fl.* solitary in the upper axils, shortly pedicellate; standard fully twice as long as the calyx. May. *l.* linear or linear-oblong, often slightly cuneate, obtuse or mucronate, ¼in. to 1in. long, flat or concave, darker-coloured beneath. *h.* 1½ft. 1801. (B. R. 1694.)

P. juniperina (Juniper-like). *fl.* in the uppermost axils, usually two or three together at the ends of the smaller branches, with occasionally one or two leafless, stipular bracts; standard fully twice as long as the calyx. June. *l.* linear or lanceolate, spreading, rigid and pungent-pointed, less than ½in. long, concave or with involute margins. *h.* 1½ft. 1824. Plant prickly.

P. j. latifolia (broad-leaved). *l.* lanceolate, rounded or sometimes almost cordate at base, tapering into a rigid, pungent point. 1832. SYN. *P. cordata* (B. M. 3443).

P. mucronata (pointed). A synonym of *P. polifolia*.

P. obcordata (obcordate).* *fl.* in the upper axils, or forming a short, terminal, leafy head; standard half as long again as the pubescent calyx. April. *l.* opposite, in whorls of three or

Pultenæa—*continued.*

scattered, broadly obovate or obcordate, about ⅛in. long, obtuse, truncate, or emarginate, pubescent when young, at length nearly glabrous. *h.* 2ft. 1803. (B. R. 403 and L. B. C. 60, under name of *Euchilus obcordatus.*)

P. paleacea (scaly). *fl.* in dense, but not large, terminal heads, sessile within the last leaves; calyx silky-hairy, the standard nearly twice as long, the lower petals shorter May. *l.* linear, with fine, straight or recurved points and revolute margins, ¼in. to ⅜in. long, pale, and usually silky-hairy beneath. *h.* 1½ft. 1789. (L. B. C. 291.)

P. pedunculata (long-flower-stalked). *fl.* small, solitary or two together at the ends of the branchlets, on filiform pedicels longer than the leaves; standard twice as long as the calyx. May. *l.* linear or oblong-lanceolate, narrowed at both ends, the margins recurved or revolute, rarely ¼in. long, rigid at first, with pungent points, which at length wear off. Plant prostrate. 1820. (B. M. 2859.)

P. polifolia (Polium-leaved). *fl.* numerous, in dense, terminal heads, sessile within the last leaves; standard not twice as long as the calyx; lower petals shorter. May. *l.* linear, obtuse, ¼in. to 1¼in. long, with a fine, straight or recurved point, hoary beneath, and often hirsute with long hairs. *h.* 2ft. 1824. SYNS. *P. mucronata* (L. B. C. 1711), *P. rosmarinifolia* (B. R. 1584).

P. polygalifolia (Polygala-leaved). A synonym of *P. villosa.*

P. retusa (retuse). *fl.* few, in small, terminal heads, sessile within the last leaves; standard not twice as long as the calyx. April. *l.* linear or linear-cuneate, very obtuse or more frequently emarginate, rarely ¼in. long, pale beneath. *h.* 1ft. 1789. (B. M. 2081; B. R. 378.)

P. rosea (rose-coloured).* *fl.* pink, produced in roundish heads, sessile within the last leaves; petals not twice as long as the calyx. April. *l.* linear-terete, obtuse or with short, callous points, channelled above by the involute margins. *h.* 2ft. 1877. (G. C. n. s., vii. p. 431.)

P. rosmarinifolia (Rosemary-leaved). A synonym of *P. polifolia.*

P. scabra (scabrous). *fl.* sessile in the upper axils, or three or four together at the ends of the branches; standard about twice as long as the calyx; keel deeply coloured. April. *l.* from obovate to narrow-cuneate, under ¼in. long, truncate, emarginate, or shortly bilobed, and often mucronate, the margins revolute, scabrous above, tomentose or hairy beneath. *h.* 1½ft. 1803.

P. s. biloba (two-lobed). *l.* narrow-cuneate, dilated, and two-lobed at the end, with a short, recurved point; tomentum short. 1817. (B. M. 2091 and L. B. C. 550, under name of *P. biloba.*)

P. stipularis (stipuled). *fl.* numerous, in dense heads, sessile within the last leaves; calyx ciliate or hirsute; standard scarcely half as long again as the calyx. April. *l.* linear, acute, five-pointed, 1in. to 1¼in. long, darker beneath; stipules narrow, often above ¼in. long. *h.* 2ft. 1792. (B. M. 475.)

P. stricta (upright).* *fl.* nearly sessile, in small, dense heads, within the last leaves; standard nearly twice as long as the calyx. April to July. *l.* obovate, mucronate, quite glabrous above, often silky-pubescent beneath. *h.* 1ft. to 3ft. 1803. (B. M. 1588; L. B. C. 974.)

P. subumbellata (sub-umbellate). *fl.* golden-yellow, streaked with crimson behind, produced in fine, terminal, sub-umbellate heads, sessile within the last leaves. April. *l.* linear, obtuse, smooth on both sides. Branches cinereous, pilose. *h.* 1ft. 1831. (B. M. 3254; B. R. 1632.)

P. tenuifolia (slender-leaved). *fl.* solitary or two together, sessile on the smaller branchlets, and often shorter than the surrounding leaves. April. *l.* narrow-linear or terete, obtuse or scarcely acute, ¼in. to ½in. long, concave or channelled above by the involute margins. *h.* 1½ft. 1817. (B. M. 2086.)

P. villosa (villous).* *fl.* solitary in each axil, but sometimes forming short, terminal, leafy racemes; petals nearly twice as long as the calyx. April. *l.* linear-oblong, pilose beneath, as well as the branches and calyces, two or three lines long. *h.* 1ft. to 3ft. 1790. (B. M. 967.) SYN. *P. polygalifolia.*

PULVEREUS. Powdery.

PULVERULENTUS. Appearing as if dusted with powdery matter.

PULVINATE. Cushion-shaped.

PULVINUS. A cushion. The term is applied to an enlargement or a swelling at the base of a leaf, or at the apex of a petiole.

PUMILUS. Short; low; dwarf.

PUMPKIN. *See* **Cucurbita Pepo.**

PUNCTATE. Dotted.

PUNCTICULATE. Minutely punctate.

PUNGENT. Terminating gradually in a sharp, rigid point; *e.g.*, the lobes of a Holly leaf.

PUNICA (called by Pliny *Malum Punicum*, the Punic or Carthaginian Apple, probably with some allusion to *puniceus*, scarlet; referring to the colour of the flowers). Pomegranate. ORD. *Lythrarieæ.* A monotypic genus; the species is a very handsome, hardy, deciduous tree. The fruit of this genus is remarkable in being composed of two whorls of carpels, one placed above the other, the lower consisting of three or four, and the upper of from five to ten, carpels; the seeds have a pellucid, pulpy covering. For culture, *see* **Pomegranate.**

P. Granatum.* Common Pomegranate. *fl.* red, from two to five together, almost sessile, rising near the tops of the branches. June to September. *l.* lanceolate or oblong, entire, dotless. Stem arboreous. *h.* 15ft. to 30ft. Orient and North-western India (largely cultivated throughout the tropics), 1548. (B. M. Pl. 113; B. M. 1832.) Of this well-known and handsome tree, there are several forms, including the following:

FIG. 325. FLOWERING BRANCH OF PUNICA GRANATUM FLORE-PLENO.

P. G. flore-pleno (double-flowered). *fl.* white, having the calyx yellowish, double. Garden variety. See Fig. 325.

P. G. nana (dwarf). *fl.* much smaller than those of the type. *fr.* about the size of a Nutmeg. *l.* narrower, linear. Stem shrubby. *h.* 5ft. to 6ft. 1723. (B. M. 634.)

In addition to these, there are a number of garden forms, varying more or less in the colour of the flowers.

PUNICEUS. Bright carmine-red.

PUNNETS. *See* **Measures.**

PUPA. The third stage in the development of an insect. Let us take, as an example, the Large White Cabbage Butterfly (see Fig. 326). This butterfly is familiar to everyone in summer and autumn, flying in gardens, even in the heart of cities. The female lays eggs on the Cabbage leaves. From this first stage, after an interval, larvæ (the second stage) emerge, very worm-like in form, with a number of similar body-rings (see Fig. 327), and a distinct head, with strong jaws for cutting the food. Each of the three segments immediately behind the head bears a pair of true, though short, jointed legs, which correspond to the three pairs possessed by the greater number of perfect insects. The sixth to ninth segments, and the last one, each bear a pair of fleshy claspers, or "prolegs," by means of which, usually, the larvæ cling to any support, while the true legs are used for holding their food, as well as for walking. The claspers are not jointed, but belong to the

Pupa—*continued.*

skin in their origin, and are not present after the larval stage. When the larva is full-fed, it crawls away to search out a safe resting-place, and then spins round its middle a silken cord, which is fixed at both ends to the support. The tail, also, is fixed to the support by a pad of silk. The larva then sheds its skin, and the Pupa emerges, of the form shown in Fig. 327. This figure shows the wing-cases protecting the future wings, and also the sheath for the left antenna. All the limbs of the perfect insect are indicated on the outer shell of the Pupa, though bound down immovably, and all useless

FIG. 326. LARGE WHITE CABBAGE BUTTERFLY.

to the insect in this stage. Throughout this stage of development no food can be eaten. The Pupa is often called chrysalis (from the Greek work *chrysos*, golden), because of the metallic-yellow spots that appear in the Pupæ of certain common Butterflies, *e.g.*, the Tortoiseshell.

From the Pupa, usually after the winter has passed, the perfect insect emerges, bursting the skin on the front half of the back along the middle line, and crawling out. At first, the wings are only the size of the wing-sheaths of the Pupa, but, in an hour or so, they grow

FIG. 327. LARVA AND PUPA OF LARGE WHITE CABBAGE BUTTERFLY.

to their full size, and become stiff and firm, and fitted for flight (see Fig. 326). This example has been selected for description as one in which the Pupa differs much in appearance, powers of movement, and many other points, from the larva on the one side, and from the perfect insect on the other. But, in several large groups of insects, the difference is less marked; *e.g.*, the Pupa of a wasp has the limbs not bound down to the body, though it moves them little, and cannot eat any food. The Pupæ of beetles resemble those of wasps in this respect. Among certain orders of insects, the metamor-

Pupa—*continued.*

phosis in incomplete, and the Pupa in these orders usually resembles the perfect insect in all points, except that the wings are represented only by rudimentary organs, quite useless for flight, and the larva differs from the Pupa only in its smaller size, and in the entire absence of any trace of wings. In these, the Pupa is as active, and feeds as voraciously, as the larva. As common insects that exemplify this condition of Pupa, may be mentioned Aphides, Crickets, and Grasshoppers. The helpless Pupæ, such as are met with among *Coleoptera*, *Diptera*, *Hymenoptera*, and *Lepidoptera* (*see* **Insects**) are usually protected in a cocoon, spun by the larva when it has reached a safe retreat, though a few resemble the Cabbage Butterflies in making no cocoon. Very often the retreat is underground, many of the larvæ burrowing, and making the cocoons in the soil, chiefly of grains of earth, cemented by a silken network, or by a fluid emitted from the mouth.

PUPALIA (*Pupali* is said to be the name in the East Indies). Including *Desmochæta*: ORD. *Amarantaceæ*. A genus comprising only three species of stove, slightly glabrous or tomentose, trichotomously-branched herbs or sub-shrubs, natives of tropical Asia and Africa. Flowers green, perfect ones solitary, the imperfect ones in fascicles, disposed in interrupted, simple or paniculate spikes; perianth of the perfect flowers five-parted, the segments lanceolate, acuminate, sub-equal; stamens five, the filaments very shortly connate at base. Leaves opposite, petiolate, ovate or orbicular, obtuse or acuminate, entire. *P. atropurpurea* is probably the only species in cultivation. It is an evergreen sub-shrub, thriving in sandy loam. It may be increased by means of cuttings, inserted in sand, under a bell glass, in heat.

P. atropurpurea (dark purple). *fl.* dark purple, disposed in spikes, 3in. to 7in. long. September. *l.* 2½in. to 3in. long, fully 1in. broad, slender, long-stalked, ovate, acuminate, obsoletely mucronulate, slightly dotted. Stem striated. Branches purplish, ascendent. *h.* 1½ft. to 2ft. Tropics, 1759.

PURGATIVE. A cathartic; any plant which is used in medicine as an evacuant.

PURIFICATION FLOWER. A common name of *Galanthus nivalis*.

PURPLE CARROT-SEED MOTH (*Depressaria depressella*). This insect is, along with congeners already mentioned (*see* **Carrot-blossom Moth** and **Flat-body Moth**), at times, hurtful to Carrots and Parsnips grown for seed, inasmuch as the larvæ feed, in company, on the flowers, protected under a slight web, spun over the umbels. When full-fed, they burrow into the stalks, and there become pupæ. The moths emerge early. The spread of wings is a little over ½in. The front wings are reddish-brown, with a bent, pale yellowish band near the hind margin, and a large, pale spot on the inner margin, beyond the middle. The head is pale yellow. The larva is green, with a tinge of red, but has the head and second segment black.

Remedies. The most efficient is hand-picking the infested umbels, and destroying the larvæ. The damage done is seldom very serious.

PURPLE MEDICK. *See* **Medicago sativa.**

PURPLE WREATH. *See* **Petræa volubilis.**

PURPURASCENS. Purplish.

PURSHIA (named after Frederick Pursh, author of "Flora Americæ Septentrionalis," 1817). SYNS. *Kunzia*, *Tigarea*. ORD. *Rosaceæ*. A monotypic genus, the species being a much-branched, hardy, evergreen shrub, with scaly buds. It thrives in a sandy soil. Propagated by cuttings of young shoots, inserted in sand, under a hand light, in early summer.

P. tridentata (three-toothed). *fl.* yellow, terminal, on short peduncles. July. *l.* obcuneate, tridentate, crowded on the points of the shoots, hairy above, tomentose beneath. *h.* 2ft. to 3ft. North-west America, 1826. (B. R. 1446; H. F. B. A. 58.)

PURSHIA (of Sprengel). A synonym of **Onosmodium** (which *see*).

PURSLANE. *See* **Portulaca oleracea.** The name is also used for several species of *Claytonia*, &c.

PURSLANE-TREE. *See* **Portulacaria afra.**

PUSCHKINIA (named in honour of M. Pouschkin, a Russian botanist). Syn. *Adamsia.* Ord. *Liliaceæ.* A genus comprising only a couple of species of hardy or half-hardy, bulbous plants, natives of Asia Minor, the Caucasus, and Afghanistan. Flowers few, loosely racemose, sometimes solitary on the simple, leafless scape; perianth with a short, campanulate tube, and six longer, sub-equal, somewhat spreading segments. Leaves radical, few, the first usually oblong, the rest linear. Only one of the species is in cultivation. This thrives very well in the rock garden and borders, in a compost of sandy loam and leaf mould. Propagated by dividing the bulbs, which should be done every two or three years.

P. libanotica (Mount Lebanon). A synonym of *P. scilloides.*

Fig. 328. Puschkinia scilloides, showing Habit, detached Flower, and Upper Portion of Leaf.

P. scilloides (Scilla-like).* Striped Squill. *fl.* white, richly striped with pale blue down the centre, and on both sides of the reflexed perianth segments; perianth ½in. to nearly 1in. across; pedicels slender, distant; spikes secund, on slender, bending scapes. Spring. *l.* few, 4in. to 6in. long, lanceolate, concave, dark green. *h.* 4in. to 8in. Orient, 1819. A very handsome little spring-flowering plant. See Fig. 328. (B. M. 2244; Gn., Sept., 1878.) Syns. *P. libanotica, P. sicula* (F. d. S. 2220), *Adamsia scilloides* (R. G. 310). A more compact-flowering form is in cultivation, under the name of *compacta;* its flowers are also more numerous.

P. sicula (Sicilian). A synonym of *P. scilloides.*

PUSILLUS. Very small; weak and slender.

PUSS MOTH (*Dicranura vinula*). This moth is of interest to gardeners, because the larvæ feed on leaves of Willows and of Poplars, and, at times, do damage to those trees. The moths reach 2½in. or 3in. in spread of wing, and have large, heavy bodies. Body and wings are grey, with many darker markings. Those on the front wings are as follows: Near the base of the wing are five or six black spots; then follows a broad, grey cross-band; the middle of the wings is less marked, but the hinder part bears about nine long, dark streaks running inwards, and a number of V-shaped, dark lines, with the tip pointed inwards. The antennæ are feathered in both sexes. The larvæ are very curious in form; the head is flat, and is drawn back into the second segment, on which the body rises to a sharp hump, then it sinks to the sixth, then is of uniform breadth to the ninth, and behind this it tapers rapidly to the last segment, which ends in two long, slender, curved horns, from each of

Puss Moth—*continued.*

which a pink filament can be pushed out by the larva when irritated. This latter is used for driving away ichneumons and other parasites. The horns are believed to be the last pair of prolegs modified. There are four pairs of prolegs used for grasping, and the larvæ generally hold on by them, keeping the ends of the body raised from the twig or leaf to which they cling. In colour, they are remarkable, though by no means conspicuous while on the trees. There is a white line along each side, from the back of the head to the tip of the hump, thence passing obliquely to the middle of each side of the eighth segment, and then again rising to the bases of the horns. Between the white lines the back is white, streaked with purple-brown. This latter colour is deepest near the lines. Below them the body is green, with a purple mark above the proleg on each side of the eighth segment. The head is brown, with black sides, and when drawn back is surrounded with a pink rim, with two black spots. When full-fed, the larvæ gnaw holes in the bark, in which they form very tough, strong cocoons, of chips and a gluey secretion emitted by themselves, and in these cocoons they become brown pupæ in autumn. The moths emerge in June. There are two or three smaller species of the same genus, which are much like the Puss Moth in appearance and in habits, and, because of this and of their smaller size, are called Kittens. Of these, the Poplar Kitten (*D. bifida*) feeds on Aspen and other Poplars, the Sallow Kitten (*D. furcula*) on Willows, and the Alder Kitten (*D. bicuspis*) on Alder. They are seldom so hurtful as to attract observation.

Remedies. If at any time any of the above are sufficiently numerous to be hurtful, the only efficient remedy is hand-picking the larvæ, or beating them from the branches. The cocoons should be sought for, and the pupæ destroyed; and the moths should be killed when seen.

PUSTULAR, PUSTULATE. Covered with glandular excrescences like blisters.

PUTAMEN. The endocarp of a stone fruit.

PUTORIA (from *putor*, a strong smell; in allusion to the smell of the leaves). Ord. *Rubiaceæ.* A small genus (two or three species) of dwarf, half-hardy, branched shrubs, inhabiting the Mediterranean region. Flowers white or purple, fascicled at the tips of the branches, about 1in. long; calyx with an elongated-ovoid tube and an obtusely four-toothed limb; corolla infundibular-tubulose, with an elongated tube and a limb of four, rather short, spreading, valvate lobes; pedicels bracteolate. Leaves opposite, shortly petioled, linear-oblong, a trifle fleshy. *P. calabrica*—the only species in cultivation—is a pretty plant. It thrives in a gravelly soil, and is propagated by division.

P. calabrica (Calabrian). *fl.* red, in terminal, few-flowered corymbs. July. *l.* oblong, obtuse, rather smooth, pale beneath, scabrous on the edges and keel; stipules solitary on both sides. Stem much branched; branches clothed with velvety down. *h.* 6in. 1820. Syns. *Asperula calabrica, Ernodea montana* (S. F. G. 143).

PUTTERLICKIA (named after A. Putterlick, 1810-1845, assistant at the Botanical Museum of Vienna). Ord. *Celastrineæ.* A genus comprising only a couple of species of greenhouse, very glabrous, spiny, South African shrubs. Flowers green, with a purple disk; calyx segments, petals, and stamens, four or five, the petals and stamens spreading; cymes axillary, paniculate; pedicels elongated, divaricate. Leaves alternate or fascicled, stalked, obovate, entire or spinuloso-serrate, exstipulate. Branchlets angular or terete. For culture of the under-mentioned species, *see* **Celastrus.**

P. Pyracantha (Pyracantha-leaved). *fl.*, petals oblong; calyx minute, obtuse. Winter. *l.* tufted, rarely solitary, oval or obovate-cuneate, netted veined. *h.* 2ft. or more (B. M. 1167, under name of *Celastrus Pyracanthus.*)

PUYA (the native name of the plant in Chili). SYN. *Pourretia.* ORD. *Bromeliaceæ.* A genus (eight or ten species) of stove or greenhouse, perennial herbs, natives of Chili and Peru. Flowers showy, blue, yellow, or white, solitary, disposed in a simple or pyramidal-branched, terminal raceme; sepals free, oblong or lanceolate, loosely imbricated; petals free, connivent in a tube at the base, spreading above, rather broad. Leaves either at the base or tip of the stem, clustered, spiny-serrate. The two species here described — probably the only ones in cultivation — thrive in a compost of loam and peat. Propagation is easily effected by suckers, or by seeds when procurable.

P. Altensteinii (Altenstein's). A synonym of *Pitcairnia Altensteinii.*

P. cærulea (blue). A synonym of *P. Whytei.*

P. gigas (giant). *fl.* white or rose-coloured, disposed in erect spikes, from 18ft. to 30ft. in height. *l.* tufted, linear-lanceolate, hoary, spiny-toothed, mealy-white beneath. New Grenada, 1881. An extraordinary species. (R. H. 1881, 74; Gn., May 6, 1882.) It is very uncertain to what genus this plant really belongs, as the flowers have not been seen by any specialist. It has the foliage of an Agave.

P. grandiflora (large-flowered). A synonym of *Pitcairnia ferruginea.*

P. heterophylla (variable-leaved). A synonym of *Pitcairnia heterophylla.*

P. longifolia (long-leaved). A synonym of *Pitcairnia heterophylla.*

P. maidifolia (Indian Corn-leaved). A synonym of *Pitcairnia maidifolia.*

P. sulphurea (sulphur-coloured). A synonym of *Pitcairnia Wendlandi.*

P. virescens (greenish). A synonym of *Pitcairnia virescens.*

P. Warcewiczii (Warcewicz's). A synonym of *Pitcairnia atrorubens.*

P. Whytei (Whyte's). *fl.* of a peculiar metallic greenish-blue colour, with bright orange anthers, disposed in a large, pyramidal panicle, on a tall scape. Autumn. *l.* tufted, crowded, recurved, elongately subulate, remotely spinescent. *h.* 3ft. Chili, 1867. A handsome plant, quite hardy in the South of England. (B. M. 5732.) SYN. *P. cærulea.*

PYCNIDIA. Small bodies, very like perithecia (*see* **Perithecium**) in general appearance and form, only they are usually smaller, paler, and thinner walled; and the spores in them, instead of being inclosed in asci, are situated, singly or in chains, on the tips of small branches of mycelium that arise from the inner surface

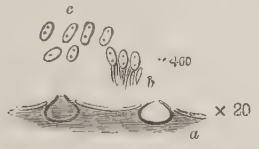


FIG. 329. PHOMA HERBARUM (Pycnidial Stage of *Pleospora herbarum*)—*a*, Pycnidia in transverse section, × 20, one opened; *b*, Conidia still on the Stalks, × 400; *c*, Conidia free after falling off the Stalks, × 400.

of the wall of the Pycnidium (see Fig. 329). The spores are called stylospores, because of being produced at the tips of these slender, rod-like branches, like a *stylus*, or pen. A reference to **Pleospora,** of which *Phoma* is a Pycnidial form, will help to render clearer the relation of this form of fruit to the perithecia.

PYCNODORIA. Included under **Pteris** (which *see*).

PYCNOPTERIS. Included under *Nephrodium.*

PYCNOSTACHYS (from *pyknos*, dense, and *stachys*, a spike; referring to the dense flower-spikes). SYN. *Echinostachys.* ORD. *Labiatæ.* A small genus (six species) of erect-growing, stove, annual or perennial herbs, natives of tropical or sub-tropical Africa and Madagascar. Flowers in whorls, which are disposed in dense, terminal spikes; corolla blue, with an exserted, defracted tube, two-lipped, the upper lip four-toothed, the lower entire and concave; calyx ovoid-campanulate, equal, with five

Pycnostachys—*continued.*

subulate-spinose teeth. Nutlets almost round, smooth. Leaves stalked, linear-lanceolate to broadly ovate, coarsely toothed. Only two species have been introduced to our gardens. For culture, *see* **Ocimum.**

P. cærulea (blue). *fl.*, corolla blue; calyx sessile; spike from 1in. to 2in. long. August. *l.* sessile, oblong or linear-lanceolate, 2in. to 3in. long, acute, slender, deeply serrated, entire, and narrowed at base, glandulose beneath. Stem over 1ft. high, tetragonal. Madagascar, 1825. Annual. (H. E. F. 202.)

P. urticifolia (Nettle-leaved). *fl.* blue; upper lip of corolla erect, with four incurved lobes; lower one concave; spike terminal, ovate, acuminate, large, thyrse-like. August. *l.* ovate, acuminate, truncate or very obtuse at base, sub-cuneate, long-stalked, deeply serrated, pubescent beneath. *h.* 3ft. Africa, 1862. Perennial. (B. M. 5365.)

PYGÆRA BUCEPHALA. *See* **Buff-tip Moth.**

PYGMÆUS. Pigmy; dwarf.

PYKNOS. This term, used in Greek compounds, signifies thick, close, dense, compact; *e.g.*, *Pycnocephalus*, thick-headed.

PYRACANTHA. *See* **Cratægus Pyracantha.**

PYRALIS (*Hypena*) **ROSTRALIS** (Hop Snout Moth). This insect is common in the southern districts of England, where the larvæ feed on the leaves of the Hop, frequently doing a great deal of harm to them. The moths, when at rest, have the wings folded horizontally, and assume the form of the Greek letter *delta* (Δ). They have long palpi, projecting forwards, and the group may be recognised by this peculiarity, whence they are called Snout Moths. The front wings are greyish-brown, darker towards the base, paler along the front margin and across the terminal half of the wing, and a dark line runs from the tip, diverging from the rear margin. The hind wings are uniform brownish. The spread of wings is a little over 1in. The larvæ are rather slender, tapering in front, pale green, with narrow, white lines lengthwise; they have six true legs and eight prolegs or claspers. When full-fed, they spin slight cocoons in leaves drawn a little together, and there become pupæ.

Remedies. Hand-picking the larvæ, and the leaves inclosing pupæ, and burning all surface rubbish with the pupæ in it, is the most effectual remedy. Beating the Hops (taking care not to injure the plants) and jarring the Hop-stakes, so as to cause the larvæ to fall on to sheets, is efficacious; the larvæ being afterwards burnt. Syringing the plants with any of the usual insecticides, by means of a garden engine, is also of use.

PYRAMIDAL. Pyramid-shaped; more frequently used, however, to denote conical; *e.g.*, a Carrot.

PYRENA. The stone caused by the hardening of the endocarp in drupaceous fruits.

PYRENOMYCETES (from *pyren*, a kernel or stone of fruit, and *mykes*, a Fungus). A very large group of Fungi, so named because they produce, in the processes of reproduction, small, hard, dark bodies (perithecia and pycnidia), in which certain forms of spores are protected. The *Pyrenomycetes* form one of three families, into which a very large order of Fungi, called *Ascomycetes*, is divided. This order is characterised by the mode of origin of a form of spore, regarded as the most highly developed of the various kinds produced in them. These spores are produced from a portion of the protoplasm, or living substance, contained in certain long, cylindrical, thin-walled cells, called asci. In each ascus (see Fig. 330) there are usually eight spores formed, but the number varies, in different Fungi, from two to an indefinite number in each, though constant in each species. In most Ascomycetous Fungi, the asci grow crowded together, either alone or intermixed with slender filaments (paraphyses) (see Fig. 330); and,

Pyrenomycetes—*continued.*

in most, these groups of asci are surrounded with an outer coating of hyphæ, united so as to simulate true parenchyma. In one group—the *Discomycetes*—this protecting tissue merely forms a saucer or disk, or a club, on which the asci stand (*e.g.*, in *Peziza*), and the surface bearing the asci is exposed. In a few, *e.g.*, *Exoascus Pruni* (*see* remarks on FUNGI, under **Plum**), the asci stand isolated and exposed, and not on any special area of the surface. In the *Pyrenomycetes*, including among them the *Perisporacei*, the protecting tissue forms a continuous sphere or flask-shaped perithecium, which entirely incloses the asci with the spores in them, and which, as in the *Perisporiaceæ*, may be entirely closed, but far more generally opens by a pore or slit on its upper surface, or at the end of a more or less elongated neck. As a rule, there are many asci in each perithecium; but in a few species they may be few, or even reduced to a single ascus, as in *Podosphæra* (*see* PLUM FUNGI). Both in *Discomycetes* and in simple *Pyrenomycetes*, the development of the asci and spores has been traced to a union of male and female organs, and the protecting layers have been traced to branches developed from the mycelium after the female cell is fertilised.

FIG. 330. TWO ASCI OF PEZIZA POSTUMA, each with eight Spores (magnified about 250 times).

The *Pyrenomycetes* live on every kind of food—on dead wood and leaves, on dead animal matter, on excrements, on the soil, and on living plants and animals; in this latter case, they are true parasites. Some of them prove hurtful to cultivated plants. An account of the more important structural characters of the *Erisypheæ*, and of the injuries they inflict, will be found under the headings **Mildew** and **Oidium**. The restricted, or true, *Pyrenomycetes* differ from the *Perisporiaceæ* (of which the *Erisypheæ* form the section of most importance to gardeners) in the perithecium opening by a pore or a slit, and in the mycelium being not superficial, but sunk among the food, whether that is dead, or a living plant or animal. Hence, the mycelium is entirely concealed; and the parts which attract our notice are, in most cases, only the reproductive organs. There are several kinds of spores produced, as has been mentioned under **Pleospora**. The ascospores, or those contained in the asci, may be round, elliptical, or thread-like, transparent or brown, undivided, or divided by one, two, three, or many septa. In this latter case, the spores often seem very complex in their structure, being built up of many cells. The perithecia vary considerably in texture, whether nearly membranous, carbonaceous, or fleshy (*Nectriaceæ*), and in form of orifice, whether a simple slit (in *Hysteriacei*), or a pore (*Pleospora*), or with thickened lips (*Lophiostomacei*). In some, the perithecia are scattered (*Pleospora*); in others, they are crowded together on specially modified parts of the Fungus (in *Xylaria*, *Claviceps*, &c.), or are sunk in the mycelium, in a mass called a "stroma." Besides the perithecia with ascospores, other structures, called *pycnidia*, much like perithecia in external appearance, are developed; and in them are contained spores, often much like those contained in the asci, *e.g.*, in *Cucurbitaria Laburni*, where both are multicellular and brown, but, perhaps, more often very different from them in appearance, *e.g.*, in *Pleospora herbarum*, in which the ascospores are multicellular and brown, and the pycnidiospores are unicellular, transparent, and very much smaller (see **Pleospora**). The pycnidia have been named *Phoma herbarum*. Pycnidia are, in most cases, smaller and thinner-walled than the perithecia; but they vary in these respects, and also in being solitary in some groups, and crowded together in others. Occasionally, they are sunk in a stroma. They usually occur on the mycelium before the perithecia are formed, but may be associated with the latter. In the pycnidia, the spores are produced on the tips of branches, not in asci; but pycnidiospores are occasionally found in the same receptacle with ascospores.

Other modes of spore formation occur in many species (*see* **Pleospora**), resulting in the formation of conidia on the tips of branches that rise from the mycelium creeping on the surface of the body in which the Fungus is growing. These conidiophores, or conidia-bearers, are very various in form and modes of branching, and in the structure and form of their spores. In some cases, they are so associated with the more perfect stages of the Fungi that there is little difficulty in recognising their relationships; *e.g.*, the very common *Tuberculatia vulgaris* on dead branches is always followed by *Nectria cinnabarina* in such a manner as to indicate clearly their being states of the same Fungus. But the greater number of conidiophorous Fungi have not yet been referred as earlier stages to higher forms, though careful observations will almost certainly result in their being so, and will free the study of microscopic Fungi from a vast amount of doubt, and from multitudes of so-called species. In the meantime, in the imperfect state of our knowledge of these plants, it is found expedient to retain them in the group called *Hyphomycetes*, even though they are thus associated with *Peronospora*, and with other forms not closely related to them. Still another mode of reproduction in some is by means of *Sclerotia*, or hard masses of mycelium (*see* **Sclerotia**). It has been necessary to enter thus fully upon the account of the modes of reproduction observed in the *Pyrenomycetes*, since it is these alone that afford material for distinguishing the various genera and species, the mycelium not yielding characters that can be relied on for genera, or even families, much less for species. For an account of the injuries inflicted on cultivated plants by the *Erisypheæ* among *Perisporiacei*, *see* **Mildew** and **Oidium**. Among the restricted *Pyrenomycetes*, a good many species are parasitic upon living plants; and several of these are injurious to field or to garden produce. Some of them are hurtful in the early stages of their growth, the perithecia being formed only after the death of the tissues on which they feed. Others only weaken the host-plants, and are to be found in all their stages upon living tissues of these plants. Some have already been referred to under the headings **Pleospora** and **Plum** (FUNGI). Among the most injurious forms may be mentioned one very hurtful to grasses that are grown for seed, viz., the Ergot (*Claviceps purpurea*), which, however, does so little harm to gardeners as to require no special notice here.

PYRETHRUM (*Pyrethron*, the old Greek name used by Dioscorides, probably from *pyr*, fire; referring to the acrid roots of this genus). Feverfew. ORD. *Compositæ*. A genus of mostly hardy, herbaceous perennials, now included, by Bentham and Hooker, under *Chrysanthemum*. "The distinctive features reside in the presence in *Pyrethrum* of a pappus, in the form of an elevated membranous

Pyrethrum—*continued.*

border, and in the achenes being angular but not winged" (Lindley and Moore). All the species here described are hardy, herbaceous perennials. For culture, &c., *see* **Chrysanthemum.**

FIG. 331. FLOWER-HEADS OF PYRETHRUM FRUTESCENS.

P. achilleæfolium (Achillea-leaved).* *fl.-heads* golden-yellow, almost globular, few, on long stalks, and disposed in loose corymbs; inner scales of the involucre round, white, and transparent at the top. Summer. *l.* pinnatifid, with pinnate segments, covered with silky down when young, and pubescent when full grown. *h.* 2ft. Caucasus, 1823. A variety known as *pubescens* has numerous heads arranged in broad corymbs.

P. corymbosum (corymbose).* *fl.-heads* white; peduncles corymbose; involucral scales ovate-lanceolate, with fuscous, scarious margins. July. *l.* pinnatisect; segments lanceolate, pinnatifid,

FIG. 332. UPPER PORTIONS OF PLANT OF PYRETHRUM ROSEUM.

Pyrethrum—*continued.*

the lobes acute and argutely serrated. Stem erect, angular, branched at apex. *h.* 1ft. Europe, &c., 1596. (J. F. A. 379, under name of *Chrysanthemum corymbosum.*)

P. frutescens (shrubby). *fl.-heads* with white ray florets. *h.* 3ft. Canary Islands, 1699. From this species a great number of varieties have sprung. See Fig. 331. *See also* **Chrysanthemum frutescens.**

P. lacustre (lake-loving). *fl.-heads* pure white, with a yellow centre, about 2in. across, solitary, terminal and axillary. Late summer. *l.* alternate, numerous, sessile, ovate-lanceolate, coarsely and irregularly toothed. *h.* 2ft. to 2½ft. Portugal.

P. parthenifolium aureum (golden Parthenium-leaved).* Golden Feather. A free-growing and well-known, hardy plant, extensively used for carpet beds and edgings. Seeds should be sown, in a gentle heat, during March. The seedlings grow very rapidly, and will be ready for planting out in May or early in June. The flower-buds must be picked off whenever they appear.

P. Parthenium (Parthenium). Common Pellitory or Feverfew. *fl.-heads* with a yellow disk and white ray, disposed in a corymbose panicle. June. *l.* stalked, compound, flat; leaflets ovate, pinnatifid and toothed. Stem erect. *h.* 2ft. Europe (Britain). The whole plant has a strong and bitter smell. (F. D. 674, under name of *Matricaria Parthenium*; Sy. En. B. 715, under name of *Chrysanthemum Parthenium*). The double-flowered form is largely grown, and is very handsome.

FIG. 333. PYRETHRUM ROSEUM FLORE-PLENO.

P. roseum (rosy).* *fl.-heads* larger than those of *Chrysanthemum leucanthemum*, solitary; ray florets rose-coloured; disk yellow. *l.* pinnatifid, with decurrent, lanceolate segments of a vivid green colour. *h.* 1ft. to 2ft. Orient. This species, with one or two others, is important from an economic point of view, as it is largely used in the manufacture of "insect powders." See Fig. 332. (B. R. 1084; B. M. 1080, under name of *Chrysanthemum coccineum.*) A large number of varieties, varying much in size and colour of flower-heads, are now grown; there is, too, a large series of double forms, one of which is represented in Fig. 333.

P. Tchihatchewii (Tchihatcheff's).* *fl.-heads* with a yellowish disk and a pure white ray, small, solitary, on axillary stalks 3in. to 6in. long. Early summer. *l.* bipinnatifid, glabrous, dark green, toothed at the base of the petiole. Stems very numerous, rooting. *h.* 2ft. Asia Minor, 1869. A handsome species, forming a dense tuft. It thrives remarkably well on slopes, dry banks, and under trees where grass will not grow. The seeds, by which it is mostly increased, should be sown in pots or pans, and the seedlings, when large enough, transplanted to their permanent quarters at about 3in. apart.

P. uliginosum (moisture-loving).* Great Oxeye. *fl.-heads* with a yellow disk and a white ray, over 2in. across, on slender and gracefully-bending stalks. August. *l.* smooth, lanceolate, sharply toothed, about 4in. long, sessile. Stems stout. *h.* 5ft. Eastern Europe, 1816. A very bold and strong-growing species, having a handsome and distinct appearance when covered with a profusion of its blossoms. It is perfectly hardy, and prefers a rather sheltered situation. (B. M. 2706.)

PYRGUS. A synonym of *Ardisia.*

PYRIFORM. The same as **Pear-shaped** (which *see*).

PYROLA (a diminutive of *Pyrus*, the Pear-tree; so-called from some fancied resemblance in the foliage, which is not obvious). Wintergreen. ORD. *Ericaceæ.* A genus comprising about fourteen species of hardy,

Pyrola—*continued.*

perennial, very glabrous, stolon-bearing, stemless or caulescent herbs (one species leafless), natives of Europe, (Britain), North and Central Asia, and North America, including Mexico. Flowers white, yellow, pink, or pale purple, on erect, bracteate, racemose scapes, nodding; calyx five-parted, persistent; petals five, concave, sessile, more or less incurved-connivent; stamens ten. Leaves radical or cauline, alternate, usually long-stalked, persistent, entire or serrated. Several species are very pretty, and well worth growing. They thrive in thin, mossy copses, on light, sandy, vegetable soil, or in moist and half-shady parts of the rockwork or fernery. Propagated by division.

P. elliptica (elliptic). *fl.* white, campanulate, with a grateful smell; racemes elongated, few-flowered, rather secund. June and July. *l.* cuneate-oblong, coriaceous, acute at base, twice as long as the narrow petioles, the margins remotely toothed or quite entire. *h.* 6in. North America, 1818. (H. F. B. A. 134.)

P. maculata (spotted). A synonym of *Chimaphila maculata.*

P. media (intermediate). *fl.* white, tinged with red, ½in. in diameter; racemes many-flowered; pedicels scattered. July and August. *l.* orbicular-ovate, crenate, sometimes 1¾in. in diameter. *h.* 4in. Europe (Britain). (Sy. En. B. 897.)

P. minor (smaller). *fl.* white, tinged with red, drooping, globose, ¼in. in diameter; raceme short; scape 8in. to 12in. long, slender. June to August. *l.* orbicular-ovate, obscurely crenate, usually arranged in a rosette, but sometimes alternate, coriaceous, 1in. to 1½in. long, contracted into the longer petiole. Europe (Britain), North America. (F. D. 55; Sy. En. B. 898.)

P. rotundifolia (round-leaved).* *fl.* pure white, fragrant, from ten to twenty in a drooping raceme on an erect stem 6in. to 12in. high. Summer. *l.* roundish, quite entire or crenulated, shorter than the dilated petioles. *h.* 6in. Europe (Britain). (F. D. 1816; Sy. En. B. 895.) The variety *arenaria* (Sy. En. B. 896), found on sandy sea-shores, differs from the type in having smaller leaves, and pedicels as long as the ovate sepals, and, generally, several scale-like bracts below the inflorescence. Both the type and its variety are exceedingly pretty plants for rockwork, and prefer a sandy soil.

P. secunda (side-flowering).* *fl.* greenish-white, horizontal, ¼in. in diameter; racemes secund, 1in. to 2in. long; scape slender, 2in. to 5in. long. July. *l.* ovate, acute, serrate, 1in. to 1½in. long, rosulate or alternate, rather thin, reticulate; petioles shorter. Stem straggling; branches 1in. to 4in. long, ascending. Europe (Britain), West Asia, North America. (F. D. 402; Sy. En. B. 899.)

P. umbellata (umbelled). A synonym of *Chimaphila corymbosa.*

P. uniflora (one-flowered). A synonym of *Moneses uniflora.*

PYROLIRION. Included under **Zephyranthes** (which *see*).

PYROSTEGIA IGNEA. A synonym of *Bignonia venusta.*

PYRRHEIMA. Included under **Tradescantia** (which *see*).

PYRULARIA (a diminutive from *Pyrus*, the Pear; in allusion to the form of the fruit, which, in the original species, is like a small Pear). SYNS. *Hamiltonia*, *Sphærocarya.* ORD. *Santalaceæ.* A genus comprising only a couple of species of deciduous trees or shrubs, one North American, the other Himalayan. Flowers cymulose at the tips of the branches, or in the upper axils; cymelets forming a terminal, compound raceme, or a raceme-like panicle; fertile flowers usually few at the tips of the branches, often twin or solitary. Drupe ovoid or sub-globose, rather large. Leaves alternate, shortly pedicellate, membranous. The only species in cultivation is a half-hardy shrub; it thrives in sandy loam, and may be increased by cuttings.

P. oleifera (oil-bearing). Buffalo, Elk, or Oil Nut. *fl.* greenish; spike small, few-flowered, terminal. May. *fr.* 1in. long. *l.* ob-ovate-oblong, acute, or pointed at both ends, soft, very veiny minutely pellucid-dotted. *h.* 3ft. to 12ft. North America, 1800. Plant minutely downy when young, at length glabrous, imbued with an acrid oil, especially the fruit. SYN. *P. pubera.*

P. pubera (downy). A synonym of *P. oleifera.*

PYRUS (the old Latin name used by Pliny for the Pear-tree). Apple, Pear, Service, &c. Including *Malus* and *Sorbus.* *Cydonia* and *Mespilus* are also included, by Bentham and Hooker, under this genus; but, for horti-

Pyrus—*continued.*

cultural purposes, they are kept distinct in this work. Some of the plants met with in gardens under the generic name of *Aronia* belong here. ORD. *Rosaceæ.* A genus comprising from thirty-five to forty species of hardy trees or shrubs, inhabiting the temperate regions of the Northern hemisphere, and the mountains of the East Indies. Flowers in terminal cymes, rarely corymbose, or reduced to one or two flowers; bracts subulate, deciduous; calyx tube urceolate or rarely turbinate; petals five, sub-orbiculate, shortly unguiculate. Fruit fleshy, ovoid, globose, or pyriform. Leaves alternate, deciduous, petiolate, simple or pinnate, often serrate; stipules deciduous. The species are readily raised from seeds, in the way mentioned under **Apple** and **Pear**; the garden varieties and weaker-growing, ornamental species are most readily propagated by grafting or budding on the Apple or Pear stocks. Except where otherwise stated, the flowers in the under-mentioned species are white.

P. acerba (sour). A synonym of *P. Malus acerba.*

P. americana (American). American Mountain Ash. *fl.* in large, flat cymes. June. *fr.* bright red, globose, not larger than peas, disposed in clusters. *l.* odd-pinnate; leaflets thirteen to fifteen, lanceolate, taper-pointed, sharply serrate, with pointed teeth, rather shining above, and scarcely pale beneath. Northern United States, &c., 1782. Tree or tall shrub. (W. D. B. i. 54.) SYN. *Sorbus americana.*

P. a. microcarpa (small-fruited). This variety is only distinguished from the type by its smaller fruits.

P. angustifolia (narrow-leaved). *fl.* rose-colour, with distinct styles. April. *l.* simple, oblong or lanceolate, often acute at the base, mostly toothed, glabrous. *h.* 20ft. North America, 1750. Tree. "Perhaps a variety of *P. coronaria*" (Asa Gray). (B. R. 1207; W. D. B. 132.)

P. arbutifolia (Arbutus-leaved).* Choke-berry. *fl.* white or tinged with purple; cymes woolly. May and June. *fr.* red or purple, pear-shaped, or, when ripe, globular. *l.* simple, oblong or obovate, finely serrate woolly beneath. *h.* 2ft. to 10ft. North America, 1700. Shrub. (B. M. 3668.) SYN. *P. floribunda* (B. R. 1006).

P. a. melanocarpa (black-fruited). This only differs from the type in its somewhat larger leaves and dark purple fruit. SYN. *P. grandifolia* (B. R. 1154).

P. Aria.* Aria; White Beam-tree. *fl.* ½in. in diameter, in loose corymbs. May and June. *fr.* dotted with red, ½in. in diameter, sub-globose. *l.* simple or pinnatifid, rarely pinnate at base, 2in. to 6in. long, very variable, glabrous above, plaited, coarsely and irregularly serrate, deeply lobed, white and flocculent beneath. *h.* 4ft. to 40ft. Europe (Britain), &c. Bush or small tree. (Sy. En. B. 482.) The following are defined by Mr. Boswell as sub-species:

P. A. latifolia (broad-leaved). *l.* from ovate-oblong to sub-orbicular, more or less lobed, grey-tomentose beneath; lobes deltoid, serrate-acuminate, the nerves five to nine on each side, less prominent beneath. This approaches *P. torminalis.*

P. A. rupicola (rock-loving). *fr.* inclining to carmine, ¾in. in diameter. *l.* obovate-oblong, lobed above, snow-white beneath; nerves five to eight on each side.

P. A. scandica (Scandinavian). *l.* less coriaceous than in the type, oblong, deeply lobed or pinnatifid, glabrous above, clothed with a loose grey tomentum beneath; lobes oblong or rounded. Arctic Europe.

P. Aucuparia (fowler's).* Mountain Ash; Rowan-tree. *fl.* cream-white, ½in. in diameter; pedicels and calyces villous; cymes 4in. to 6in. in diameter, compound, corymbose, dense-flowered. May and June. *fr.* scarlet, with yellow flesh, globose, ¾in. in diameter. *l.* 5in. to 8in. long, pinnate; leaflets six to eight pairs, 1in. to 1½in. long, linear-oblong, sub-acute, serrate, pale beneath, and hairy along the midrib and nerves, glabrous beneath when old, or nearly so. *h.* 10ft. to 30ft. Europe (Britain), Siberia, &c. Tree. (Sy. En. B. 486.) Of this species there are many varieties, the principal of which are: *fastigiata*, a form of strict, erect, habit; *fructu-luteo*, with yellow fruit; *pendula*, with weeping branches; and *variegata*, with variegated leaves.

P. baccata (berried).* *fl.*, calyx lobes deciduous; peduncles crowded. April and May. *fr.* yellow, tinged with red, roundish, about the size of a cherry. *l.* ovate, acute, equally serrated, glabrous, the length of the petioles. *h.* 15ft. to 20ft. Siberia and Dahuria, 1784. Tree. The pulp of the fruit is used, in Siberia, for making quasar punch. (B. M. 6112.)

P. betulæfolia (Birch-leaved). *fl.* disposed in sessile umbels, appearing before the leaves; anthers deep red. *fr.* brownish, dotted with white, small, sub-globose. *l.* whitish, on long petioles, elliptic, acute at both ends, serrate, 2in. long, 1in. broad. China, 1879. Shrub. See Fig. 334. (R. H. 1879, 318.)

Pyrus—*continued.*

P. Bollwylleriana (Bollwyllerian). *fl.* disposed in many-flowered corymbs. April. *fr.* orange-yellow, small, turbinate. *l.* simple, ovate, coarsely serrated, tomentose beneath and on the buds, when young velvety above, but glabrous in the adult state. *h.* 20ft. ‹ Rhineland, 1780. Tree. (B. R. 1437.) SYN. *P. Pollveria* (L. B. C. 1009).

P. Botryapium (Botryapium). A synonym of *Amelanchier canadensis.*

Pyrus —*continued.*

lanceolate, acute, entire, covered with a whitish, silky pubescence. Asia Minor, &c. An ornamental and distinct bush or small tree.

P. fennica (Finnland). This resembles *P. Aria scandica*, but has the leaves pinnatifid towards the base; it is regarded, by Boswell, as a hybrid between that plant and *P. Aucuparia*, of which latter it possesses the sweet-scented flower and other characteristics. Europe (Island of Arran). Tree. SYN. *P. pinnatifida* (Sy. En. B. 485).

FIG. 334. FRUITING BRANCH OF PYRUS BETULÆFOLIA.

P. Chamæmespilus (Bastard Medlar).* Bastard Quince. *fl.* reddish. May and June. *fr.* red, round. *l.* ovate, serrated, glabrous, clothed, when young, with deciduous down. *h.* 5ft. to 6ft. Mountainous parts of Europe, &c., 1683. Shrub. SYNS. *Cratægus Chamæmespilus* (J. F. A. 231), *Sorbus Chamæmespilus.*

P. C. Hostii (Host's). *fl.* rose-pink, in large, terminal corymbs. Spring. *l.* broad-elliptic, obtuse, often lobed, with serrated margins. *h.* 10ft. Tree or shrub. SYNS. *P. Hostii* (Gn., Oct., 1881), *Aria Hostii*, *Cratægus Hostii.*

P. communis (common). Wild Pear. *fl.* 1in. to 1½in. in diameter; cymes simple. April and May. *fr.* pyriform, 1in. to 2in. long. *l.* 1in. to 1½in. long, fascicled on the last year's wood, alternate on the shoots, oblong-ovate, acute, obtusely serrate, more or less pubescent or flocculent below when young; those of the young tree often lobed; petioles slender. *h.* 20ft. to 40ft. Europe (Britain), &c. Shrub or small tree. (Sy. En. B. 488.) Of this species there are several varieties, the following being the most distinct. *See also* **Pear.**

P. c. Achras (Achras). *fr.* rounded at the base. *l.* broader than in the type, acute or cuspidate, flocculent on both surfaces when young. Rare.

P. c. Briggsii (Briggs'). A synonym of *P. cordata.*]

P. c. Pyraster (Pyraster). *fr.* obconical at base. *l.* shortly acuminate, pubescent below when young.

P. cordata (heart-shaped). *fr.* very small, globose or pyriform. *l.* ovate, rounded at base. SYN. *P. communis Briggsii* (J. B. 180).

P. coronaria (crowned).* Sweet-scented Crab. *fl.* rose-colour, large, fragrant, few in the corymb; styles woolly, united at base. May. *fr.* greenish, fragrant. *l.* simple, ovate, often rather heart-shaped, cut-serrate or lobed, soon glabrous. *h.* 20ft. North America, 1724. Tree. (B. M. 2009.) *P. angustifolia* is perhaps a variety of this species.

P. domestica (domestic).* True Service-tree. *fl.* cream-colour, about the size of those of the Hawthorn, panicled. May. *fr.* reddish-spotted, obovate, about 1in. long. *l.* pinnate; leaflets uniform, serrated towards the points, clothed beneath with deciduous, cottony down. *h.* 20ft. to 60ft. Britain. The fruit of this tree, if tasted in an unripe state, is extremely austere, causing a most painful and durable irritation in the throat; but when mellowed by frost or keeping, it becomes brown, soft, and edible, resembling a medlar, though, to most palates, less agreeable (G. C. n. s., vi. 649.) SYN. *Sorbus domestica* (J. F. A. 447).

P. elæagnifolia (Wild Olive-leaved). *fl.* white, small; pedicels densely tomentose. May. *fr.* small, globose, crowned with the prominent calyx. *l.* lanceolate, oblong-lanceolate, or linear-

P. floribunda (free-flowering).* *fl.* beautiful rich rosy-red, very freely produced. May. *fr.* long-stalked, very small, nearly spherical. *l.* small. Shoots slender. Japan, &c. One of the most ornamental of hardy shrubs. See Fig. 335. (R. H. 1881, 296, under name of *Malus microcarpa floribunda.*)

FIG. 335. FRUITING BRANCH AND DETACHED FRUIT OF PYRUS FLORIBUNDA.

Pyrus—*continued.*

P. floribunda (free-flowering), of Lindley. A synonym of *P. arbutifolia.*

P. grandifolia (large-leaved). A synonym of *P. arbutifolia melanocarpa.*

P. Hostii (Host's). A synonym of *P. Chamæmespilus Hostii.*

FIG. 336. FLOWERING BRANCH OF PYRUS JAPONICA.

P. japonica (Japanese).* *fl.* deep scarlet, solitary or two or three together, produced the greater part of the year; calyx glabrous; lobes short, obtuse, entire. *fr.* green, very fragrant, but not edible, ripening in October. *l.* oval, somewhat cuneate, crenate-serrate, quite glabrous on both surfaces; stipules reniform, serrated. *h.* 5ft. to 6ft. Japan, 1815. Deciduous shrub. Under the genus *Pyrus*, this is the proper name of the plant described in this work as *Cydonia japonica.* See Fig. 336.

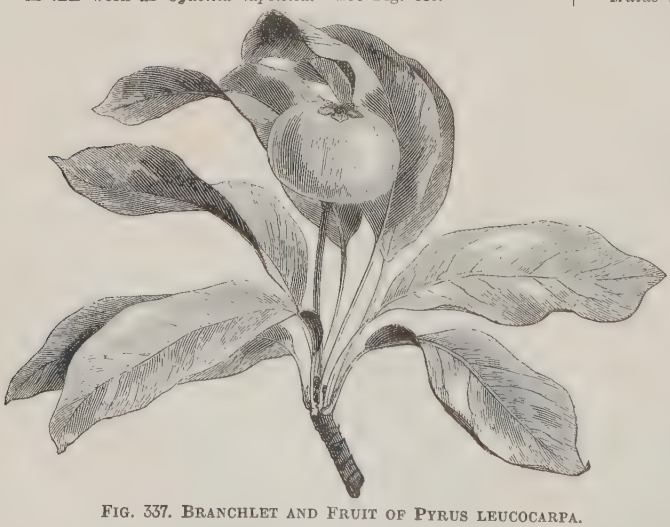


FIG. 337. BRANCHLET AND FRUIT OF PYRUS LEUCOCARPA.

P. leucocarpa (white-fruited). *fr.* depressed both above and below; eye not sunk; skin dull white or creamy at maturity. 1879. This tree is very remarkable for the peculiar colour of the fruits. See Fig. 337. (R. H. 1879, p. 365.)

P. Malus. Crab; Wild Apple. *fl.* pink and white, few, 1½in. in diameter; calyx segments woolly; peduncles umbellate. May. *fr.* yellow, 1in. in diameter, sub-globose, indented at the base. *l.* 1in. to 2in. long, oblong, rounded, acuminate or cuspidate at the tip, glabrous or downy beneath when young. Branches spreading. *h.* 20ft. Europe (Britain). Shrub or small tree. *See also* **Apple.**

Pyrus—*continued.*

P. M. acerba (sour). *fl.*, tube of calyx glabrous; pedicels slender, glabrous or nearly so. *fr.* drooping. *l.*, young ones glabrous. SYN. *P. acerba.*

FIG. 338. FRUITS OF PYRUS MALUS BERTINI.

P. M. Bertini (Bertin's). This form is remarkable for the freedom with which its handsome, brightly-coloured fruits are produced. See Fig. 338.

P. M. cratægina (Hawthorn-like). *fr.* with the calyx segments long and persistent, somewhat resembling some of the large-fruited Thorns. *l.* long-stalked, like those of the common Crab in outline. See Fig. 339. (R. H. 1881, 291, under name of *Malus microcarpa cratægina.*)

P. M. mitis (small). *fl.*, pedicels stout, and, as well as the calyx tube and young leaves, pubescent. *fr.* erect.

P. M. præcox (early). This variety is principally interesting by reason of its long-stalked, persistent fruits. (R. H. 1881, 297, under name of *Malus microcarpa præcox.*)

P. M. sempervirens (evergreen). Evergreen Crab. *fr.* short-stalked, round. *l.* deeply and irregularly toothed, retained on tree sometimes throughout the winter. (R. H. 1881, 296, under name of *Malus microcarpa sempervirens.*)

P. Maulei (Maule's).* *fl.* bright red. April. *fr.* golden-yellow, produced in great abundance, agreeably perfumed, but exceedingly acid to the taste. *l.* somewhat smaller than those of *P. japonica*, and plant dwarfer and more compact in habit. Japan, 1874. One of the most beautiful of recently-introduced shrubs. The fruit makes an excellent conserve. Under the generic name *Pyrus*, this is the correct name of the plant described in this work as *Cydonia Maulei.* See Fig. 340.

P. nivalis (snowy). Snow-tree. *fl.* white, large, shortly-stalked. May. *fr.* rounded or depressed; skin yellowish-green, spotted with brown or red on the sunny side, smooth. *l.* oboval-obtuse, mucronate, crenated at the summit, or lanceolate, entire, covered with a greyish pubescence. Europe, &c. Tree. (B. R. 1482; J. F. A. ii. 107.)

P. pinnatifida (pinnatifid-leaved). A synonym of *P. fennica.*

P. Pollveria (Bollwyllerian). A synonym of *P. Bollwylleriana.*

P. prunifolia (Prunus-leaved). Siberian Crab. *fl.* much resembling those of the common Pear; peduncles pubescent; styles woolly at the base. April and May. *fr.*, when ripe, yellowish, but red on the side exposed to the sun, globose, of an austere taste, decaying like the fruit of the Medlar, and then more palatable. *l.* ovate, acuminate, serrate, glabrous, resembling those of the Cherry-tree, on long petioles. *h.* 20ft. to 30ft. Siberia, 1758. Tree. (B. M. 6158.)

P. salvifolia (Sage-leaved). *fl.* on simple, umbellate pedicels. April and May. *fr.* large, elongated, very useful for making perry. *l.* lanceolate, quite entire, tomentose beneath, when

Pyrus—*continued.*

young velvety above, but in the adult state glabrous. Branches thick. *h.* 20ft. to 30ft. Europe. Tree. (B. R. 1482.) This is simply a form of *P. nivalis*, with somewhat broader leaves.

FIG. 339. FRUITING BRANCH OF PYRUS MALUS CRATÆGINA.

P. sambucifolia (Elder-leaved). *fl.* larger than in *P. americana*; cymes smaller. June. *fr.* larger, when young ovoid, at length globose. *l.* oblong-oval or lanceolate-ovate, mostly obtuse or abruptly short-pointed, serrate (mostly doubly), with more spreading teeth, often pale beneath. Excepting in the above characters, this species resembles *P. americana*, of which it is perhaps a variety. Tree.

P. Sieboldii (Siebold's), of Carrière. *fr.* regularly top-shaped; stalk long, inserted in a shallow basin; eye slightly depressed; skin russet-brown, with pale spots; flesh white, juicy, with a very peculiar flavour. Japan, 1880. Tree. (R. H. 1880, p. 110.)

P. Sieboldii (Siebold's), of Regel. A synonym of *P. Toringo*.

P. Simonii (Simon's). *fl.* numerous, in compact corymbs. Spring. *fr.* yellow, somewhat spherical, 2in. in diameter. *l.* cordate-

FIG. 340. FLOWERING BRANCHES AND DETACHED FLOWER OF PYRUS MAULEI.

Pyrus—*continued.*

ovate, furnished with bristly teeth. China, 1872. A vigorous tree, with upright branches. (R. H. 1872, 28, Fig. 3.)

P. sinensis (Chinese). Sandy Pear; Snow Pear. *fl.* white. April. A tree differing from the European Pear in its "longer, greener branches; larger, more lucid, and almost evergreen leaves; insipid, apple-shaped, warted, very gritty fruit; and a calyx the inside of which is destitute of the down that is found in all the varieties of the European Pear" (Lindley). Very conspicuous in spring, by reason of the glossy, bronzy-red tints of the young leaves. China, 1820. (B. R. 1248; G. C. n. s., iv. 457.)

P. spectabilis (showy).* *fl.* pale red, large, when open semi-double; buds of a deeper hue; umbels sessile, many-flowered; petals ovate, unguiculate; styles woolly at base. April and May. *l.* oval-oblong, serrated, glabrous, as well as the calyx tube. *h.* 20ft. to 30ft. China, 1780. Tree. (B. M. 267.)

P. s. Kaido (Kaido). *fl.* before expansion dull vinous-red; the interior when expanded blush-white, and the exterior blush at the edges, the centre wine-red; very abundant, large. *fr.* numerous, said to be edible after becoming bletted. Japan, 1874.

P. Toringo.* Toringo Crab. *fl.* white or faintly rosy. May. *fr.* very small, long-stalked. *l.* simple or lobed, often almost compound, and much resembling those of some of the Cratægus on the young barren shoots. Japan. Tree or shrub. See Fig. 341. (R. H. 1881, 296, under name of *Malus microcarpa Toringo.*) SYN. *P. Sieboldii* (of Regel).

FIG. 341. FRUITING BRANCH AND DETACHED FRUIT OF PYRUS TORINGO.

P. T. Ringo (Ringo). A free-flowering, ornamental bush or small tree, with, generally, three or four-celled fruits. Leaves generally more incised than in the type. (R. H. 1881, 297, under name of *Malus microcarpa Ringo.*)

P. torminalis (griping). Wild Service. *fl.* numerous, ½in. in diameter. April and May. *fr.* pyriform or sub-globose, greenish-brown dotted. *l.* 2in. to 4in. long, oblong-ovate or cordate, six to ten-lobed, when mature glabrous on both surfaces; lobes triangular, acuminate. *h.* 10ft. to 50ft. Europe (Britain), North Africa. Tree.

Pyrus—*continued.*

P. ussuriensis (Ussuri). *fl.* white; filaments as long as calyx: styles three, free, glabrous. May. *l.* broadly oval, pointed, sharply toothed, fading to a fine brownish-red in autumn. Stalk of roundish fruit about the same length as its diameter. *h.* 20ft. to 30ft. Amurland, &c., 1861. Tree.

PYTHION. A synonym of *Amorphophallus.*

PYTHIUM (from the Greek word *pytho*, I cause to putrefy; plants inhabited by these Fungi soon decay). A genus of Fungi, in which are included a number of species, all of which are parasites in the interior of plants. Some of them are hurtful to certain cultivated plants. There is considerable doubt as to the actual number of distinct species of *Pythium*, as several are probably the same Fungus under different names; *e.g.*, the following have been described as found in Potato plants: *P. Equiseti* (Sadeb.), *P. incertum* (Renny), *P. vexans* (De By.), and *P. proliferum* (De By.). In regard to the first three of these, Mr. W. G. Smith expresses his inability to distinguish them from one another. The genus belongs to a group of Fungi with distinct mycelium, producing sporangia at the tips of the branches, in which zoospores are produced, in the form of fragments of protoplasm, each provided with two cilia; or, rather, the zoospores are formed after the contents of the sporangia flow out into the surrounding water. On the mycelium, sexual reproduction is effected by the formation of a globular cell (the oosphere) on the end of a short branch (oogonium). Near this another small branch forms, and, growing to and piercing the oogonium, fertilises the oosphere, and produces thereby a single resting spore or oospore within it. The very nearly allied genus, *Saprolegnia*, differs from *Pythium* in the zoospores being formed inside the sporangia, and in more than one oospore being formed in each oogonium.

The food or host-plants inhabited by species of *Pythium* belong to widely-separated groups, including Algæ, prothalli, and leafy plants of *Equiseta*, or Horsetails, prothalli of Ferns, and Potatoes. *P. de Baryanum*, a widely-distributed parasite, lives in germinating plants of Clover, Spurrey, Camelina, Maize, &c. This last species renders the lowest part of the young stems soft and tender, and soon causes decay. Its mycelium traverses all the parts that appear withered. In damp air, branches grow out, and form on the tip rounded cells, in some of which are produced zoospores, in others oospores, and on other branches conidia are formed. In whatever way formed, the spores give origin to a mycelium, which bores into suitable food-plants and reproduces the Fungus.

Remedies are hardly to be found, owing to the species of *Pythium* being internal parasites. Diseased plants should be removed and destroyed, to prevent the spread of these or of any other causes of disease.

PYXIDANTHERA (from *pyxis, pyxidos*, a box, and *anthera*, an anther; the anther opening as if by a lid). ORD. *Diapensiaceæ*. A monotypic genus, closely allied to *Diapensia*. The species is a minute, prostrate, creeping herb or sub-shrub. It is a remarkably pretty little plant for the rock garden, and thrives best in very sandy soil, and in sunny situations.

P. barbulata (small-bearded).* Pine-barren Beauty. *fl.* white or rose, solitary, sessile, very numerous; corolla five-lobed, shortly campanulate, the lobes patent and obovate. Early summer. *l.* imbricate, narrow, oblanceolate, entire, bearded at the base, mostly alternate on the sterile branches. *h.* 2in. New Jersey, 1851. (B. M. 4592.) SYN. *Diapensia barbulata.*

PYXIDATE. Furnished with a lid.

QUADRI. A term, used in Latin compounds, signifying four; *e.g.*, Quadrifoliolate, when a petiole bears four leaflets from the same point; Quadrijugate, in four pairs.

QUADRIA. A synonym of **Guevina** (which *see*).

QUAKING GRASS. *See* **Briza.**

QUALEA (the native name in Guiana). ORD. *Vochysiaceæ*. A genus comprising about twenty-five species of curious, stove, resinous trees, natives of Brazil and Guiana. Flowers yellow, pink, or blue, rather large, disposed in lateral and terminal racemes or panicles; sepals five, free; petal one, unguiculate, obovate or obcordate. Leaves opposite or verticillate, coriaceous, petiolate, costate; petioles biglandulose at base. The only species in cultivation—*Q. rosea*—thrives in a compost of peat and leaf mould. Propagation may be effected by seeds, sown on a hotbed; or by cuttings of half-ripened shoots, inserted in sandy soil, under a bell glass, in bottom heat.

Q. rosea (rose-coloured). *fl.*, petal, as well as the large segment of the calyx, white on the outside, rose-coloured on the inside, entire; spur shorter than the calyx. *l.* elliptic, acuminate, glabrous on both surfaces. *h.* 30ft. Guiana. (A. G. 1.) SYN. *Q. violacea.*

Q. violacea (violaceous). A synonym of *Q. rosea.*

QUAMASH, or **CAMASH.** A common name for *Camassia esculenta.*

QUAMOCLIT. Included under **Ipomœa** (which *see*).

QUAQUA (name given to the plant by the Hottentots, who eat the stems raw). ORD. *Asclepiadeæ*. A monotypic genus. The species is an erect, dwarf, branched, and rather bushy, greenhouse succulent, allied to *Boucerosia*, requiring culture similar to **Stapelia** (which *see*).

Q. hottentotorum (Hottentot). *fl.* in fascicles of six to ten or more, along the grooves between the angles of the branches, on very short pedicels; calyx pale green or purplish; corolla pale greenish-yellow, ¼in. in diameter, with five spreading lobes; corona pale yellow, very minute. Older stems 1in. thick, younger ones ½in. to ¾in. thick; angles four, rounded, armed with stout, horizontal or slightly decurved, decussate, brown-pointed teeth. *h.* 4in. to 6in. Plant greyish-green or purplish, glabrous. Namaqualand, 1878. (G. C. n. s., xii. 1.)

QUARTINIA. A synonym of **Pterolobium** (which *see*).

QUASSIA (a name applied by Linnæus to a tree of Surinam, in honour of a negro, Quassi or Coissi, who employed its bark as a remedy for fever). ORD. *Simarubeæ*. A monotypic genus, the species being a lofty, stove tree, more curious than beautiful, and in appearance similar to the common Ash. It thrives in a compost of rich, sandy loam and leaf mould. Propagated by cuttings, made of ripe shoots, and inserted in sand, under a bell glass, in heat.

Q. amara (bitter). *fl.* scarlet, large, tubulose, arranged in terminal clusters. *l.* alternate, impari-pinnate; petioles winged; leaflets opposite, entire. *h.* 20ft. Tropical America, 1790. The wood of this tree is destitute of smell, but has an intensely bitter taste, on which account it was used as a tonic; the root and the bark have also been considered valuable remedies in dysentery. (B. M. 497.)

QUATERNARY, QUATERNATE. Disposed in fours.

QUEBEC OAK. *See* **Quercus alba.**

QUEEN LILY. *See* **Phædranassa.**

QUEEN OF THE MEADOWS. *See* **Spiræa Ulmaria.**

QUEKETTIA (named in honour of the late E. J. Quekett, F.L.S., an excellent botanical observer, and one of our best vegetable anatomists). ORD. *Orchideæ*. A monotypic genus. The species is a singular little epiphyte, of more botanical than horticultural interest. It requires culture similar to **Pleurothallis** (which *see*).

Q. microscopica (microscopic). *fl.* yellow, nearly sessile, cylindrical, ⅛in. long, disposed in a panicle about 3in. long. *l.* terete, subulate, about 3in. long, mottled with light green, deep green, and purple. Brazil.

QUELTIA. Included under *Narcissus.*

QUERCITRON. *See* **Quercus tinctoria.**

QUERCUS (the Latin name). Oak. ORD. *Cupuliferæ*. A well-known genus, comprising nearly 300 species, of mostly hardy trees, rarely shrubs. Flowers monœcious, in unisexual, amentaceous or erect, very rarely androgynous, sessile or sub-sessile spikes; males in catkins, with usually six, sometimes ten to twelve stamens; females solitary, inclosed in imbricating bracts or scales, with a more or less perfect three-celled ovary, very rarely four or five-celled. Nut (glans or acorn) fixed to, or included within, a cup; seed, by abortion, usually solitary. Leaves alternate, annual or perennial, entire, toothed, or lobed, membranous or coriaceous, penniveined. As acorns do not long retain their germinative powers, it is best to sow them soon after they are ripe. It is of little use trying to import from, or export to, distant countries seeds of any of the species unless these are packed tightly in damp clay or earth. The curious variegated and other forms of the common Oak, &c., must be propagated by grafting. *See also* **Oak**. A selection from the introduced species and their varieties is given below. They are hardy trees, except where otherwise stated. The flowers are usually produced in spring, and the nuts shed in the autumn.

Q. acuta (acute-leaved). *fl.*, catkins flexile, shorter than the leaves, pendulous, solitary or fasciculate; female spikes short. *fr.*, cup hemispherical, with concentric rings; nut ovoid or ellipsoid, apiculate, thrice exceeding the cup. *l.* acute or obtuse at base, elliptic or oblong, abruptly acuminate, entire or undulate-crenate towards the apex, 2in. to 4½in. long, ⅝in. to 2in. broad; young ones fulvous-tomentose, older ones glabrous; petioles about 1in. long; stipules ⅝in. long, narrow-linear, pilose at back. Japan. Tree or shrub. Of this evergreen species there are two varieties in gardens: *albo-nervis*, with white-veined, and *roseo-nervis*, with red-veined, leaves. (W. & F. 85.) SYN. *Q. Buergeri*.

Q. Ægilops. Ægilops, Vallonea, or Velani Oak. *fl.* greenish-white. *fr.*, cup very large, hemispherical, with lanceolate, elongated, spreading scales; nut brown, very ornamental. *l.* ovate-oblong, with bristle-pointed, tooth-like lobes, hoary beneath. *h.* 20ft. to 50ft. Grecian Archipelago, 1731. Evergreen or nearly so. The cups and acorns are exported from the Levant in large quantities, being in great demand for tanning purposes. (K. E. E. 7.) SYN. *Q. Ungeri* (K. E. E. 13). Of this species, there are two varieties: *latifolia*, with rather broader leaves, and *pendula*, with drooping branches.

Q. agrifolia (scabby-leaved). Enceno Oak. *fl.*, catkins longer than the leaves. *fr.*, cup turbinate, ½in. broad, with adpressed scales, more or less ciliated on their margins; nut ⅝in. to 1¼in. long, ovoid-oblong, exserted, acute. *l.* broadly ovate or oval, subcordate, remotely spine-toothed, 1½in. to 2in. long, seven to eighteen lines broad, chartaceous; adult ones glabrous; petioles ¼in. long. Young branches pubescent. *h.* 20ft. California, 1849. Evergreen. (J. H. S. vi. 157.)

Q. alba (white). American White Oak; Quebec Oak. *fl.*, catkins slender. *fr.*, cup hemispherical-saucer-shaped, rough or tubercled at maturity, naked, much shorter than the nut, which is about 1in. long, ovoid or oblong, with an edible kernel. *l.*, mature ones 3in. to 6in. long, 1in. to 3in. broad, obovate-oblong, obliquely cut into from three to nine oblong or linear, obtuse, mostly entire lobes, smooth, pale or glaucous beneath, bright green above. *h.* 60ft. North America, 1724. A large and valuable, deciduous tree. (B. M. Pl. 250; E. T. S. M. i. 145.) In the variety *repanda*, the leaves are irregularly sinuated or sinuately lobed.

Q. aquatica (aquatic). Water Oak. *fr.* small; cup saucer-shaped or hemispherical; nut dark brown, globular-ovoid. *l.* obovate-spathulate or narrowly wedge-shaped, with a long tapering base, and an often obscurely three-lobed summit, varying to oblanceolate, thick, 1in. to 4in. long, ½in. to 2in. broad; those on seedlings and strong shoots often incised or sinuate-pinnatifid, then mostly bristle-pointed; petioles rarely ¼in. long. *h.* 60ft. to 80ft. North America (near ponds, &c.), 1723. Deciduous. The wood of this species is similar to that of all other North American Oaks.

Q. austriaca sempervirens (evergreen Austrian). A synonym of *Q. glandulifera*.

Q. Ballota (Ballota). Barbary Oak; Sweet Acorn Oak. *fr.*, scales of the cup usually convex at back; kernel of a mild and agreeable flavour. *l.* often rounded at base, dentate or entire, very hoary beneath. South-west Europe, &c.

Q. bambusæfolia (Bambusa-leaved). A synonym of *Q. salicina*.

Q. Banisteri (Banister's). A synonym of *Q. ilicifolia*.

Q. bicolor (two-coloured). Swamp White Oak. *fl.*, catkins pilose. *fr.* borne on peduncles much longer than the petioles; cup hemispherical, about ½in. long, hoary, the upper scales awn-shaped, sometimes forming a mossy-fringed margin; nut scarcely 1in. long, ellipsoid. *l.* obovate or oblong-obovate, wedge-shaped at base, coarsely sinuate-crenate and often rather pinnatifid than toothed, soft-downy and white-hoary beneath, the main primary veins six to eight pairs, lax and a little prominent. *h.* 60ft. North America, 1800. Deciduous. (E. T. S. M. 153.) SYN. *Q. Prinus tomentosa*.

Quercus—*continued.*

Q. Buergeri (Buerger's). A synonym of *Q. acuta*.

Q. Catesbæi (Catesby's). Scrub Oak. *fr.* hemispherical-turbinate half as long as the blackish, ellipsoid nut, with adpressed, slightly silky scales. *l.* 4in. to 7in. long, 3in. to 6in. broad, shortly petiolate, cuneate at base, oblong, deeply cut into three to five unequal, often falcate or spreading, ovate, acuminate lobes, which are subulate-mucronate at the apex, and also sometimes on the margins, the central one trilobed; young ones pubescent, adult ones glabrous. *h.* 15ft. to 30ft. North America, 1823. Deciduous.

FIG. 342. BRANCH OF QUERCUS CERRIS, WITH MALE CATKINS.

Q. Cerris (Cerris).* Bitter, Mossy-cupped, or Turkey Oak. *fl.* greenish-white; catkins pubescent, 1in. to 3in. long; females at the sides of a short peduncle. *fr.* solitary or twin; cup hemispherical, bristly, with elongated, pubescent scales; nut brown, cylindrical, ⅝in. to 1¼in. long. *l.* oblong or obovate, variable, sinuate-toothed or often pinnatifid, with obtuse or acute, often mucronulate lobes, very shortly pilose on both sides, rarely stellate above, on very short petioles; stipules narrow-linear, pilose. Young branches pubescent. *h.* 40ft. to 60ft. South Europe, &c., 1735. See Figs. 342 and 343. (W. D. B. ii. 92.)

Q. C. austriaca (Austrian). *l.* on rather long stalks, ovate-oblong, slightly but copiously sinuated, downy and hoary beneath; lobes short, ovate, acute, entire; stipules shorter than the footstalks. *h.* 40ft. South-east Europe, 1824. (K. E. E. 20, under name of *Q. austriaca*.)

Q. C. crispa (curled). *l.* somewhat curled at the edges. Bark corky. *h.* over 60ft.

Q. C. dentata (toothed). A garden synonym of *Q. C. subperennis*.

Q. C. fulhamensis (Fulham). A garden synonym of *Q. C. subperennis*.

Q. C. Lucumbeana (Lucombe). A garden synonym of *Q. C. subperennis*.

Q. C. pendula (pendulous). *l.* narrow, deeply lobed; lobes obtuse or sub-acute. Branches long, pendent or prostrate.

Q. C. subperennis (almost evergreen). *fr.*, scales of the cup ovate, loosely erect. *l.* variable, sometimes incised, sometimes curled, almost evergreen. This variety is also known in gardens as *Q. C. dentata* (W. D. B. 93), *Q. C. fulhamensis* (G. C. n. s., viii. 139), and *Q. C. Lucumbeana*.

Q. C. variegata (variegated). In this variety, the leaves are variegated.

Q. cinerea (ashy-grey). Blue Jack; Upland Willow Oak. *fl.*, catkins 1in. to 1½in. long. *fr.* solitary, sessile or very shortly pedunculate; cup hemispherical-turbinate, with adpressed, silky scales; nut globular, often half as long again as the cup. *l.* acute or obtuse at base, oblong or obovate-oblong, often obtuse, mucronate, entire, sparsely stellate-hairy above, and thickly so below, 1½in. to 3in. long, six to ten lines broad, on very short petioles. North America, 1789. A small, twisted, sub-evergreen tree, rarely exceeding 30ft. in height, the bark yielding a yellow dye. SYN. *Q. Phellos cinerea*.

Q. coccifera (berry-bearing). Kermes Oak. *fl.*, males on long, slender peduncles; females sessile, three to seven, on a rachis eight to fifteen lines long. *fr.* on a short, thick peduncle, sometimes sub-sessile, solitary or twin; cup hemispherical, with

Quercus—*continued.*

velvety, sub-equal scales; nut more or less exserted, rarely included. *l.* elliptic or oblong, cordate at base, or obtuse or rarely acute, sparsely spiny-toothed or mucronate-serrate, or rarely entire, rigid, on short petioles. Branchlets stellately pubescent. *h.* 15ft. South Europe, &c., 1683. Evergreen. The bark of this species is used by tanners, and it sustains an insect like the cochineal, which is used as a crimson dye. (K. E. E. 29: S. F. G. 944.)

FIG. 343. BRANCHLET OF QUERCUS CERRIS, WITH ACORN.

Q. coccinea (scarlet).* *fl.*, catkins pilose. *fr.* top-shaped or hemispherical, with a conical, scaly base, seven to nine lines broad, coarsely scaly; nut ½in. to ¾in. long, half or more covered by the cup. *l.*, in the ordinary forms (at least, on full-grown trees), bright green, shining above, turning red in autumn, deeply pinnatifid, 3in. to 8in. long, 2in. to 5in. broad; lobes divergent and sparingly cut-toothed; petioles 1in. to 2in. long. *h.* 50ft. North America, 1691. Deciduous. (E. T. S. M. 163.)

Q. conferta (clustered).* Hungarian Oak. *l.* very shortly stalked or almost sessile, 5in. to 7in. or more long, 3in. to 4in. broad, pubescent beneath with stellate hairs, oblong-obovate, tapering gradually to the base, pinnately lobed; lobes oblong, acute, not spine-pointed, entire or slightly lobulate; petioles pilose; stipules longer than the petioles. South-eastern Europe. (G. C. n. s., v. 85.) SYN. *Q. pannonica.*

Q. cupressoides (Cypress-like). A synonym of *Q. pedunculata fastigiata.*

Q. cuspidata (cuspidate). *fl.*, catkins slender, simple or branched, almost equalling the leaves, slightly erect. *fr.* in an alternate, ovoid, acute, fulvous-velvety spike, the scales subverticillate, connate except at the apex, including the nut. *l.* acute or obtuse at base, ovate-lanceolate or oblong, acuminate, entire or undulate-serrate, coriaceous, 1½in. to 3½in. long, seven to fifteen lines broad, on short petioles; young ones pilose, adults glabrous. *h.* 30ft. Japan. Evergreen. (G. C. n. s., xii. 233; S. Z. F. J. 2.) *angustifolia* and *latifolia* are respectively narrow-leaved and broad-leaved forms. *variegata* is a form with prettily-variegated foliage.

Q. densiflora (dense-flowered). *fl.*, catkins dense-flowered, equalling or slightly longer than the leaves. *fr.* one to three on a peduncle shorter than the petioles; cup ½in. long, nearly ¾in. broad, the outer scales silky, the inner ones adpressed, ¼in. long; nut half-exserted, ovoid, pubescent. *l.* obtuse or rarely acute at base, oblong, ovate, or obovate-oblong, obtuse or sub-acute at apex; margins cartilaginous, revolute, undulated, entire or nearly so; young ones stellately tomentose on both sides. California, 1865. Semi-evergreen tree or shrub.

Quercus—*continued.*

Q. Esculus (Esculus). Italian Oak. *fr.* nearly sessile, solitary or in pairs; cup scaly, hemispherical; nut the size of a small pea. *l.* scattered, aggregated at the top, ovate-oblong, sinuated, smooth, paler beneath, 2in. to 3in. long, not more than 1¼in. broad; segments bluntish, somewhat angular at the base. *h.* 20ft. to 30ft. South Europe, 1739.

Q. falcata (sickle-shaped). American "Spanish" Oak. *fl.*, catkins slender, pilose, 2in. to 3in. long. *fr.* solitary or twin, on a very short peduncle; cup saucer-shaped, with a somewhat turbinate base, about half the length of the globose, brown nut, which is four to five lines long. *l.* obtuse or rounded at the base, very variable, three to five-lobed above, greyish-downy or fulvous underneath, 3in. to 5in. long, 2in. to 3in. broad; lobes prolonged, mostly narrow and more or less scythe-shaped, especially the terminal one, entire or sparingly cut-toothed. North America, 1763. A large, deciduous tree, often 80ft. high; bark rich in tannin.

Q. ferruginea (rusty). A synonym of *Q. nigra.*

Q. fruticosa (shrubby). A synonym of *Q. humilis.*

Q. glabra (glabrous). Japanese Oak. *fl.*, male spikes 1½in. to 2in. long, erect, usually solitary, the rachis slightly adpressed-pilose. *fr.* solitary or fascicled and connate at the sides of a peduncle; cup hemispherical, seven to eight lines broad, with cinereous-velvety, adpressed scales, thrice exceeded by the oblong nut. *l.* obovate-oblong, long-narrowed to the base, obtuse at apex, acuminate, entire, glabrous, 2in. to 4in. long, 1in. to 1½in. broad, on petioles nearly ½in. long. Branches glabrous. Japan, 1879. Evergreen. (G. C. n. s. xiv. 785; S. Z. F. J. i. 89.)

Q. glandulifera (gland-bearing).* *fl.*, catkins filiform, loose, pendulous; female spikes hoary-pubescent, longer or shorter than the petioles, few-flowered. *fr.* solitary or few to a peduncle; cup hemispherical, five to eight lines broad, with adpressed, puberulous, lanceolate scales; nut ovoid or ellipsoid, twice or thrice exceeding the cup. *l.* obtuse or rarely acute at base, elliptic, obovate, or lanceolate, acute or acuminate, rarely obtuse, glandular-serrate, 2in. to 5in. long, ¾in. to 2in. broad; young ones adpressedly silky; adults glabrous above; petioles varying from one to six lines long. Japan, 1870. Evergreen. The plant grown in gardens under this name and figured G. C. n. s., xiv. 714, is probably a hybrid from *Q. Cerris subperennis.* SYNS. *Q. austriaca sempervirens, Q. sclerophylla* (of gardens).

Q. glauca (glaucous). *fl.*, catkins loose-flowered, diffuse, solitary or fasciculate, nearly 2in. long, the rachis tomentose. *fr.* solitary or twin, on a very short peduncle; cup hemispherical, four to five lines long, with five to seven concentric, silky lamellæ; nut ovoid-acute, about eight lines long. *l.* acute or slightly obtuse at base, ovate-lanceolate or oblong, acuminate, serrate or undulate-serrate, 2½in. to 5in. long, ¾in. to 2in. broad; young ones much narrowed at base, sparsely pilose above, adpressedly silky beneath. Young branches sparsely pilose. *h.* 30ft. Japan, 1822. Deciduous. Of this species, several varieties are to be found in gardens.

Q. gramuntia (Gramont). A synonym of *Q. Ilex.*

Q. humilis (dwarf). *fr.* sessile or shortly pedunculate; cup shortened, broadly cyathiform, with adpressed, greyish-pubescent scales; nut more or less exceeding the cup. *l.* sometimes persistent, shortly petiolate, ovate, elliptic, or obovate, with irregular, acute or obtuse teeth, 1in. to 1½in. long, ½in. to 1in. broad, on very short petioles, sparsely puberulous above, hoary beneath. *h.* 1ft. to 12ft. South-west Europe, 1874. Shrub or under-shrub. (G. C. n. s., i. 113.) SYN. *Q. fruticosa.*

Q. Ilex (Holly).* Evergreen, Holly, or Holm Oak. *fl.* solitary or few on a peduncle, or sub-sessile; cup hemispherical or rarely turbinate, with velvety, erect, more or less adpressed scales, rarely slightly spreading at apex; nut fully twice as large as the calyx. *l.* elliptic, oblong, ovate or lanceolate, acute, toothed or entire, coriaceous, glabrous above, beneath, as well as on the branches, velvety stellate-hoary. South Europe, 1581. A large, evergreen shrub, or low or middle-sized tree, of which there are many varieties. (K. E. E. 38; W. D. B. 90.) SYN. *O. gramuntia.* The principal forms are: *crispa*, leaves wrinkled at the edges; *fagifolia*, leaves broader and less rigid, more or less undulated, and sometimes slightly serrated; *integrifolia*, leaves lanceolate, entire; *latifolia*, leaves broad and almost entire; *longifolia*, leaves very long and narrow; *serratifolia*, leaves lanceolate, serrated; *Fordii* (SYN. *fastigiata*), habit pyramidal, not spreading as in the type (R. H. 1861, 114).

Q. I. fastigiata (pyramidal). A synonym of *Q. I. Fordii.*

Q. ilicifolia (Holly-leaved). Bear or Black Scrub Oak. *fr.*, cup saucer-shaped, about half as long as the fully-developed nut, turbinate at base; nut brown, ovoid, globular, five to six lines long. *l.* obovate, wedge-shaped at base, angularly five (rarely three to seven) lobed, 2in. to 4in. long, white-downy beneath, rather thick, on slender petioles; lobes short and triangular, spreading. Young branches slightly velvety-hoary. *h.* 3ft. to 8ft. North America, 1800. A straggling, deciduous shrub. (E. T. S. M. 171.) SYN. *Q. Banisteri.*

Q. imbricaria (imbricating). Laurel Oak; Shingle Oak. *fl.*, catkins slender, pilose, 1in. to 1½in. long. *fr.* solitary, sessile or very shortly pedunculate; cup three to four lines long, narrowed at the base, inclosing one-half to one-third of the nearly hemispherical nut, the broad and whitish scales closely adpressed.

Quercus—*continued.*

l. entire, 3in. to 5in. long, lanceolate-oblong, acute or obtuse at each end, mucronate, pale and downy beneath, borne on short petioles. *h.* 40ft. to 50ft. North America. Deciduous.

Q. incana (hoary). *fl.*, catkins slender, often 1in. long. *fr.* solitary, twin, or in threes; cup, when young, covered with ovate, adpressed, pubescent scales; nut ovoid-oblong, half as long again as the cup. *l.* ovate-lanceolate or oblong, obtuse at base, acuminate at apex, remotely serrated except at base, stellate-puberulous above, minutely stellate-tomentose beneath. Young branches velvety-hoary. *h.* 40ft. Nepaul, 1818. Evergreen. SYN. *Q. lanata.*

Q. inversa (inverted-fruited). A synonym of *Q. thalassica.*

Q. lanata (woolly). A synonym of *Q. incana.*

Q. libani (Lebanon). *fr.* solitary, sub-sessile; cup campanulate, ⅜in. to 1in. long, with thick, greyish-velvety, adpressed scales; nut broadly ellipsoid, depressed at apex, slightly or twice exceeding the cup. *l.* ovate-lanceolate, acute, obtuse or acute at base, 1½in. to 3in. long, eight to fifteen lines broad, deeply crenate-serrate, glabrous above, the young ones minutely stellate-puberulous beneath. *h.* 30ft. Syria, 1870. (R. H. 1872, 155, and 1877, 172.) The form *pendula* has pendulous branches.

Q. lyrata (lyrate). Over-cup Oak; Water White Oak. *fr.* sessile, 1in. long; cup round-ovate, with rugged scales, almost covering the roundish nut. *l.* 5in. to 8in. long, shortly stalked, crowded at the ends of the branchlets, obovate-oblong, acute at the base, seven to nine-lobed, white-tomentose beneath, or at length smoothish, shining above; lobes triangular, acute, and entire, *h.* 50ft. North America, 1786. Deciduous.

Q. macrocarpa (large-fruited). Burr Oak; Mossy-cup White Oak. *fr.*, cup very variable, especially in size, deep, thick, and woody, conspicuously imbricated with hard and thick, pointed scales, the upper ones awned, so as to make a mossy-fringed border; nut broadly ovoid, 1in. to 1½in. long, half immersed in, or entirely inclosed by, the cup. *l.* obovate or oblong, lyrately pinnatifid or deeply sinuate-lobed, or nearly parted, irregular, downy or pale beneath, 4in. to 15in. long, 2in. to 4in. broad; lobes sparingly and obtusely toothed, or the smaller ones entire. *h.* 30ft. North America. A handsome, deciduous tree. (E. T. S. M. 149.) *Q. olivæformis* is regarded, by Professor Asa Gray, as a mere form of this species, with oblong cups and nuts, and narrower and more deeply lobed leaves.

Q. montana (mountain). A synonym of *Q. Prinus.*

Q. nigra (black).* Barren or Black Jack Oak. *fr.* sub-sessile, solitary or twin; cup top-shaped, coarse-scaly; nut short, ovoid. *l.* broadly cuneate, but sometimes rounded or obscurely cordate at the base, widely dilated and somewhat trilobed (rarely five-lobed) at the summit, occasionally with one or two lateral, conspicuously bristle-tipped lobes or teeth, rusty-pubescent beneath, shining above, 4in. to 9in. long. *h.* 8ft. to 25ft. North America, 1739. Deciduous. SYN. *Q. ferruginea.*

Q. obtusiloba (obtuse-lobed). A synonym of *Q. stellata.*

Q. olivæformis (Olive-shape-fruited). A variety of *Q. macrocarpa.*

Q. palustris (marsh-loving). Pin Oak. *fl.*, catkins pilose; cup flat saucer-shaped, five to seven lines broad, sometimes contracted into a short scaly base or stalk, five-scaled, very much shorter than the ovoid or globose acorn, which is five to seven lines long. *l.* deeply pinnatifid, with divergent lobes and broad rounded sinuses. *h.* 60ft. North America, 1800. Deciduous. (E. T. S. M. 167.)

Q. pannonica (Hungarian). A synonym of *Q. conferta.*

Q. pectinata (comb-like). A synonym of *Q. pedunculata filicifolia.*

Q. pedunculata (peduncled).* *fr.*, cup imbricated; nut oblong; stalk elongated. *l.* oblong, smooth, dilated upwards; sinuses rather acute; lobes obtuse. Branches spreading, tortuous. *h.* 50ft. to over 100ft. Europe (Britain), &c. Deciduous. A sub-species of *Q. Robur.* (Sy. En. B. 1288.) The following are varieties:

Q. p. Concordia (Concordia).* *l.* bright yellow, maintaining their colour throughout the season. In places where this variety succeeds well, it is one of the most effective of golden-foliaged trees. (I. H. xiv. 537.)

Q. p. fastigiata (pyramidal). A handsome tree, with erect, pyramidal branches; in general form it resembles the Lombardy Poplar. (G. C. n. s., xix. 179.) SYNS. *Q. cupressoides, Q. pyramidalis* (of gardens).

Q. p. filicifolia (Fern-leaved). *l.* with narrow lobes almost cut down to the midrib. SYN. *Q. pectinata* (G. C. n. s., xiv. 632).

Q. p. heterophylla (variable-leaved).* *l.* variable in outline, irregularly sinuate or lobed.

Q. p. Hodginsii (Hodgins'). *l.* much smaller than in the type. Habit pyramidal.

Q. p. pendula (pendulous). Weeping Oak. A variety with pendulous branches.

Q. p. purpurascens (purplish). *l.*, young ones almost entirely purple, very striking. Young shoots and footstalks tinged with purple.

Q. p. variegata (variegated). *l.* variegated with purple and white.

Q. Phellos (Phellos).* Willow Oak. *fl.*, catkins slender, half as long as the leaves. *fr.* solitary, sessile or very shortly peduncu-

Quercus—*continued.*

late; cup saucer-shaped, with ovate, adpressed, obtuse, silky scales; nut usually one-half longer than the cup. *l.* acute or obtuse at base, linear-oblong, bristly-acuminate or cuspidate, entire or undulated, light green, 3in. to 4in. long. *h.* 50ft. North America, 1723. Deciduous.

Q. P. cinerea (ashy-grey). A synonym of *Q. cinerea.*

Q. Prinus (Prinus). Chestnut Oak. *fr.* on peduncles shorter than the petioles; cup thick, ½in. to 1in. wide, mostly tuberculate, with hard and stout scales, hoary, about half the length of the edible nut, which is 1in. or less long. *l.* variable, obovate or oblong, with an obtuse or acute base, undulately crenate-toothed, minutely downy beneath; the main primary ribs ten to sixteen pairs, straight, prominent beneath. *h.* 20ft. to 90ft. North America, 1730. Deciduous. SYN. *Q. montana.*

Q. P. tomentosa (tomentose). A synonym of *P. bicolor.*

Q. pseudosuber. Bastard Cork-tree; False Cork Oak. *fl.*, male catkins numerous, 2in. long; female flowers scattered. *fr.* few, shortly pedunculate or sub-sessile; cup ½in. to 1in. long, hemispherical or obovoid-turbinate; scales greyish-pubescent, at length spreading or reflexed; nut often twice as long as the cup. *l.* obtuse or acute at base, ovate or oblong, 2½in. to 3in. long, shortly petiolate, toothed or crenate, mucronate, above sparsely, and below thickly, white-pubescent; stipules narrow-linear, pubescent. *h.* 50ft. South Europe, 1824. Evergreen. (K. E. E. 35.) SYN. *Q. Turneri.*

Q. pyramidalis (pyramidal). A garden synonym of *Q. pedunculata fastigiata.*

Q. pyrenaica (Pyrenean). A synonym of *Q. Toza.*

Q. reticulata (netted). *fr.* on long peduncles; cup hemispherical, pubescent, two to four lines long, with adpressed scales; nut semi-exserted. *l.* shortly petiolate or sub-sessile, sub-cordate or cordate at base, obovate, rounded at the apex, 2in. to 4in. long, 1½in. to 3in. broad, mucronate, crenate-denticulate, or almost entire, glabrescent above, fulvous-tomentose and reticulated beneath. Young branches yellow-tomentose. *h.* 10ft. Mexico, 1840. Half-hardy evergreen.

Q. Robur (Robur). Black Oak; Common Oak. Under this name Hooker, De Candolle, and other eminent authorities, include *Q. pedunculata* and *Q. sessiliflora*, the British representatives of the genus, as sub-species; but, for garden purposes, it is desirable here to accord them specific rank. *See also* **Oak.**

Q. rubra (red).* Champion or Red Oak. *fr.*, cup saucer-shaped or flat, with a narrow, raised border (⅜in. to 1in. in diameter) of rather fine, closely adpressed scales, sessile or on a very short and abrupt, narrow stalk or neck, very much shorter than the oblong-ovoid or ellipsoid nut, which is 1in. or less in length. *l.* acute or often obtuse at the base, elliptic or oblong, rather thin, moderately (rarely very deeply) pinnatifid, turning dark red after frost. Bark of trunk dark grey, rather smooth. North America, 1769. A large tree. The wood is reddish and coarse-grained. (E. T. S. M. 169.)

Q. salicina (Willow-like). Willow Oak. *fl.*, catkins shorter than the leaves. *fr.* solitary, on a short peduncle; cup shortly hemispherical, ⅜in. broad, with five or six concentric zones; nut ellipsoid, much exserted. *l.* shortly petiolate, slightly acute or obtuse at base, acuminate, entire or remotely serrate-denticulate, coriaceous, glabrous above, and beneath when old; young ones adpressedly pilose beneath. Young branchlets pubescent. Japan, 1860. Evergreen shrub. SYN. *Q. bambusæfolia.*

Q. sclerophylla (hard-leaved), of Lindley. *fr.* sessile, approximating; cup sub-globose, ½in. broad, tomentose, with adpressed scales; nut slightly protruding, pubescent. *l.* petiolate, ovate or elliptic, sub-acute at base, obtuse and narrowed at apex, deeply serrate, 3in. to 6in. long, 1½in. to 3in. broad, glabrous above, glaucous-pubescent beneath. Branches glabrous. North China, 1850. Evergreen shrub. (L. & P. F. G. i. 59.)

Q. sclerophylla (hard-leaved), of gardens. A synonym of *P. glandulifera.*

Q. serrata (serrated).* Japanese Silkworm Oak. *fl.*, catkins loose, pendulous, 1in. to 2in. long; females in the axils, solitary or twin. *fr.*, cup hemispherical, seven to twelve lines broad, with greyish-velvety scales, larger at the base; nut ellipsoid, scarcely exceeding the cup. *l.* obtuse or rarely acute at base, oblong or lanceolate, acute or rarely obtuse, crenate-serrate, with long, bristly teeth, 2in. to 8in. long, ½in. to 2in. broad, on petioles ¼in. to 1in. long; young ones slightly silky; adults glabrous. Young branches silky-pubescent. *h.* 6ft. Japan. Half-hardy evergreen. (W. & F., Dec. 12, 1883.)

Q. sessiliflora (sessile-flowered).* *fr.* sessile, or on a usually shortened peduncle; nut oblong. *l.* on more or less elongated petioles, oblong, smooth; sinuses opposite, rather obtuse; lobes acute. *h.* 60ft. Britain. Deciduous. A sub-species of *Q. Robur.* It may be distinguished from the closely-allied *Q. pedunculata* by its less tufted appearance, the paler green of its foliage, its less tortuous spray and branches, the lighter-coloured bark, the larger buds, and by the stalked leaves being frequently retained, after withering, until the following spring. The wood of *Q. sessiliflora* is, moreover, darker, heavier, and more elastic than that of *Q. pedunculata*; the acorns, too, are sessile, or very shortly stalked. (Sy. En. B. 1289.)

Quercus—*continued.*

Q. s. cochleata (shell-shaped). The edges of the leaves in this form are curved upwards, and the upper surface is thus rendered more or less shell-shaped.

Q. s. Louetti (Louett's).* *l.* long, narrow, almost sessile, narrowed to both ends, about 5in. long and less than 1in. broad.

Q. s. rubicunda (rubicund). *l.* rather deep red, especially in the earlier part of the summer.

Q. Skinneri (Skinner's). *fl.*, catkins pubescent. *fr.* very distinct, large, on a peduncle two to six lines long; cup flat-patelliform, 1¼in. to 1½in. broad, with adpressed, ovate-deltoid, sub-velvety scales; nut 1½in. long, and as much broad at base, globose-ovoid. *l.* long-stalked, ovate or sub-lanceolate-oblong, acute or obtuse at base, acuminate at apex, bristly-toothed on the margins and at apex; young ones slightly puberulous; adults glabrous. Young branches glabrous. Mexico. Shrub. (G. C. 1841, p. 116.)

Q. stellata (starry). Post Oak. *fr.*, cup deep saucer-shaped, naked, one-third or one-half the length of the nut, which is ovoid in shape, ½in. to ¾in. long. *l.* greyish or yellowish-downy beneath, pale and rough above, thickish, sinuately cut into five to seven rounded, divergent lobes, the upper ones much larger and often one to three-notched. North America, 1819. A deciduous tree, rarely exceeding 50ft. in height. (E. T. S. M. 151.) SYN. *Q. obtusiloba.*

FIG. 344. FRUIT AND LEAVES OF QUERCUS SUBER.

Q. Suber (probably derived from *suphar*, bark).* Cork Oak; Cork-tree. *fr.* often solitary, pedunculate or sessile; cup obovate-hemispherical, obconical or rarely obtuse at base, ½in. to ¾in. long, and more broad, with velvety, erect and adpressed scales; nut often exceeding the cup by one-half. *l.* usually 1in. to 2in. long, ½in. to 1¼in. broad, on petioles two to six lines long, ovate, oval, or oblong, acute, toothed or rarely entire, glabrous above, beneath, as well as on the branchlets, stellate-velvety-hoary. Bark suberose. *h.* 25ft. South Europe, 1581. This evergreen tree furnishes the cork of commerce. See Fig. 344. (K. E. E. 33; W. D. B. 80.)

Q. thalassica (sea-green). *fl.*, catkins elongated, dense, pilose. *fr.* many, approximating, sessile in spikes, on peduncles 2in. to 3in. long; cup five lines broad, shortly hemispherical, tomentose, with adpressed, mucronate scales; nut obovoid, eight lines in length, long-exserted. *l.* acute or acuminate at base, elliptic or obovate-oblong, slightly obtuse, acuminated, 3in. to 5in. long, ½in. to 1¼in. broad, entire or slightly serrated near the apex, very glabrous above, glaucous-tomentose beneath. Branches tomentose. China, 1850. Evergreen shrub. SYN. *Q. inversa* (L. & P. F. G. i. 36).

Q. tinctoria (dyers'). Quercitron; Black, Dyers', or Yellow-barked Oak. *fr.*, cup flat beneath; nut globose. *l.* downy beneath, obovate-oblong, dilated, widely sinuated, large, turning brownish, orange, or dull red, in the autumn, resembling those of *Q. coccinea*, but having fewer lobes; lobes short, obtuse, slightly toothed, bristle-pointed. Bark dark-coloured and rough. *h.* 80ft. to 100ft. United States, 1800. (B. M. Pl. 251.)

Quercus—*continued.*

Q. Toza (Toza).* *fr.* sessile or shortly pedunculate; cup hemispherical, four to six lines long, with loose, adpressed scales, pubescent outside; nut two to four times longer than the cup, ovate-ellipsoid. *l.* ovate or oblong, 2in. to 4in. long, ½in. to 1⅝in. broad, variously pinnatifid, stellato-pilose above, very densely stellato-rufous-tomentose beneath; lobes ovate or oblong, obtuse. South Europe, &c. Deciduous. (K. E. E. 22.) SYN. *Q. pyrenaica.*

Q. Turneri (Turner's). A synonym of *Q. pseudosuber.*

Q. Ungeri (Unger's). A synonym of *Q. Ægilops.*

Q. virens (green). Live Oak. *fr.* one to three on usually conspicuous peduncles; cup turbinate, five to eight lines long, greyish, with adpressed, slightly velvety scales; nut oblong, exceeding the cup by one-half or more. *l.* 1in. to 3in. long, ½in. to 1¼in. broad, oblong-elliptical, hoary beneath as well as on the branches, entire or irregularly lobed-dentate. *h.* 40ft. or more. North America, 1737. Evergreen.

QUERNALES. A name given to plants which agree in general characters with *Quercus.*

QUESNELIA (named in honour of M. Quesnel, a French Consul at Cayenne, who was the means of introducing the genus to Europe). SYN. *Lievena.* ORD. *Bromeliaceæ.* A small genus (three or four species) of stove, herbaceous, Brazilian plants, allied to *Billbergia.* Sepals free above the ovary, ovate, imbricated; petals free, narrow, the apex dilated into a spreading lamina; stamens three, alternating with the petals; inflorescence cone-like, simple, ovoid or oblong, thick; peduncle terminal, tall, clothed with spathe-like scales. Leaves clustered, long, spinuloso-serrated. For culture, *see* **Billbergia.**

Q. roseo-marginata (rose-margined). This is the correct name of the plant described in this work as *Billbergia roseo-marginata.*

Q. rufa (red). This is the proper name of the plant described in this work as *Billbergia Quesneliana.*

Q. Van Houttei (Van Houtte's). *fl.* white, cobalt-blue at the tips, crowded in many series, each subtended by a bract; bracts rose-coloured above, and clothed below with white down; inflorescence a large, cylindrical spike, borne on a scape 1½ft. to 2ft. high. *l.* numerous, armed with strong spines, sometimes banded with white beneath. (B. H. 1881, 18.)

QUICKTHORN. A common name for *Cratægus Oxyacantha.*

QUILLAI-TREE. *See* **Quillaja saponaria.**

QUILLAJA (from the Chilian name, *Quillai* or *Cullay*). SYN. *Smegmadermos.* ORD. *Rosaceæ.* A small genus (three or four species) of very glabrous, greenhouse, evergreen trees, some remarkable in possessing a soap-like bark; they are natives of South Brazil, Chili, and Peru. Flowers rather large, tomentose; lateral ones male, central ones purplish; calyx coriaceous, persistent, five-lobed, valvate; petals five, small, sessile, spathulate; pedicels bibracteolate; peduncles axillary and terminal, three to five-flowered. Leaves scattered, petiolate, simple, thickly coriaceous, almost entire, veined. The bark of the under-mentioned species contains a considerable amount of carbonate of lime and other mineral substances, also saponine, a vegetable-soap principle, on which account it is used for washing and cleaning clothes, &c. For culture, *see* **Kageneckia.**

Q. saponaria (Soapwort). Quillai, or Soap Bark-tree. *fl.* white, usually terminal, either solitary or from three to five on a stalk. April. *l.* oval, mostly toothed, smooth, shining, short-stalked. *h.* 50ft. to 60ft. Chili, 1832. (R. H. 1873, 254.)

QUINARY, QUINATE. Disposed in fives.

QUINCE (*Cydonia vulgaris*). The Quince is a native of Northern Persia, but naturalised throughout the Mediterranean region, &c., whence it was long since introduced to this country. It forms a spreading, deciduous tree, the branches of which are usually much contorted. The fruits emit a powerful and rather peculiar perfume when ripe, and are exceedingly acid and astringent in a raw state. They are chiefly used for making a kind of marmalade, and other preserves, and for adding, in small

Quince—*continued.*

quantities, to Apples when cooking, to give briskness and increased flavour. The chief use of the Quince-tree is, perhaps, that of providing stocks whereon to graft Pears. It is naturally inclined to root near the surface, and the roots are fibry, in comparison with those of the Pear itself, which is also used. The Quince stock possesses, in most instances, the valuable property of dwarfing the growth of Pear-trees, and causing them to become more productive than they would be on their own roots; hence, it is extensively and most successfully used for this purpose (*see* **Pear**). Most orchards—in all the southern parts of the country, at least—are furnished with one or more specimens of Quince. The trees seldom perfect their fruit northwards.

FIG. 345. FRUIT AND LEAVES OF PORTUGAL QUINCE.

Propagation is most generally effected by cuttings and by layers; by seeds also, when any are obtainable. Cuttings of the current year's wood, with a heel of two-year-old wood attached, may be inserted in the open ground, early in autumn. They soon root, and will be ready for grafting or budding about the second, or sometimes the third, year afterwards. Layers may be obtained in quantity from an old stool that has been cut down. Young shoots proceed from the base, and when firm enough, the following autumn, these may be layered, or the stock itself covered with soil, into which the new growths will root. The following autumn, they may be detached and planted in nursery rows, and the next year other young ones will again proceed from the stock, which may, in turn, be similarly treated.

The Quince is not naturally inclined to grow straight and upright; to get standard trees, therefore, considerable attention and encouragement are necessary in training to get a vigorous and tolerably straight stem. As a stock, the Quince is not much required to form standards: the straight stem may be obtained, as a rule, more easily by adopting a system of double-grafting, as described under **Pear.**

Quince-trees succeed best in rather moist situations, where the soil is rich and somewhat light, not of a heavy, clayey nature. An open, sunny situation is necessary where the ripening and perfecting of fruit is of importance. The fruits may be allowed to hang on the tree until the approach of frost: they are seldom ripe before the end of October. When gathered, they should be laid on clean straw, or on a cool fruit-room shelf, away from other specimens of fruit, until becoming quite yellow, when they will be fit for use.

Quince—*continued.*

There are only three principal varieties of Quince cultivated for the use of their fruits. These are enumerated below.

Apple-shaped. Fruit roundish, somewhat similar to an apple, of a rich golden colour when ripe. Tree very productive.

Pear-shaped. Fruit pyriform, rather larger than the preceding, and later in ripening; skin also paler-coloured, and rather woolly. This is the variety most commonly grown.

Portugal. Fruit very large, sometimes 4in. long and 3in. in diameter at the thickest part, elongated, and often irregular in outline; skin deep yellow, thickly covered with a woolly substance. This variety is superior in flavour to either of the others, but the tree is not so productive. It grows very vigorously. See Fig. 345.

QUINCE, BENGAL. *See* **Ægle.**

QUININE PLANTS. The principal of these are several species of *Cinchona*, viz., *C. Calisaya*, *C. Ledgeriana*, *C. officinalis*, *C. succirubra*, &c.

QUINQUE. A term, used in Latin compounds, signifying five; *e.g.*, Quinquefoliolate, five-leaved; Quinquenerved, applied to a leaf having five ribs all proceeding from the same point of the base.

QUINSY-BERRY. The fruit of *Ribes nigrum.*

QUINTILIA. A synonym of **Stauranthera** (which *see*).

QUISQUALIS (from *quis*, who, and *qualis*, what kind; it was uncertain, when the name was given, to what class or order the genus belonged). ORD. *Combretaceæ.* A genus consisting of two species of stove, climbing shrubs, with slender branchlets, natives of

FIG. 346. FLOWERING BRANCHLET OF QUISQUALIS INDICA.

tropical Asia and tropical and South Africa. Flowers white or red (colours variable), showy, disposed in short, axillary and terminal spikes, sometimes racemose; calyx tube produced a considerable length above the ovary; petals five, large or small, obtuse. Fruit rather large, dry, oblong, coriaceous, five-winged, one-seeded. Leaves opposite or nearly so, membranous, oblong or obovate,

Quisqualis—*continued.*

acuminate, entire. *Q. indica* thrives in a compost of peat and loam, the latter preponderating. Propagation may be effected by cuttings of the young shoots, taken off with a heel, and inserted in sand, under a bell glass, in bottom heat. The other species, *Q. parviflora*, a native of Natal, is not in cultivation.

Q. glabra (smooth). A synonym of *Q. indica.*

Q. indica (Indian).* Rangoon Creeper. *fl.* varying in colour from orange to red, beautiful, sweet-scented; petals oval-oblong, adpressedly pubescent. May to August. *l.* ovate, acuminate. Tropical Asia and Africa, 1815. Plant pubescent or glabrous. See Fig. 346. (B. M. 2033; B. R. 492.) SYNS. *Q. glabra, Q. pubescens, Q. sinensis* (B. R. xxx. 15).

Q. pubescens (downy). A synonym of *Q. indica.*

Q. sinensis (Chinese). A synonym of *Q. indica.*

QUIVER-TREE. A common name for *Aloe dichotoma.*

QUIVISIA (*Bois de Quivi* is the name given in the Isle of France). ORD. *Meliaceæ.* A genus comprising five species of stove trees and shrubs, natives of the Mauritius and Madagascar. Flowers axillary, solitary or shortly cymose; calyx cupular, four or five-toothed, persistent; petals four or five, oblong or linear, valvate or imbricated. Leaves sub-opposite or alternate, simple, entire or pinnately lobed on the same branches, shining above, reticulately veined. *Q. heterophylla*—the only species introduced—requires a compost of sandy loam and fibry peat. It may be increased by cuttings of ripened shoots, inserted in sand, under a glass, in brisk bottom heat.

Q. heterophylla (variable-leaved). *fl.* white; pedicels twin, axillary, one-flowered. *l.* alternate, oval or obovate, entire, sinuate-toothed or pinnatifid. *h.* 10ft. to 15ft. Mauritius, 1822. This is placed, by Baker, together with several other forms, which have been described as species, under *Q. mauritiana.*

RACE. "A variety of such fixity that it is reproduced by seed; also used, in a looser and more extended sense, for a series of related individuals, without particular regard for rank" (Asa Gray).

RACEME. An inflorescence in which the flowers are arranged singly, on distinct pedicels, along a common axis.

RACEMIFEROUS. Bearing racemes.

RACEMOSE. In racemes; having the appearance or character of a raceme.

RACHIS, or **RHACHIS.** The axis of an inflorescence or of a compound leaf.

RADEMACHIA. A synonym of *Artocarpus.*

RADIATE. Spreading from, or arranged around, a common centre, or around the circumference of a circle; *e.g.*, the arms of an umbel, or the ligulate florets of Composites.

RADICAL. Of, belonging to, or proceeding from, a root, or from a root-like portion of stem at or below the surface of the soil.

RADICANT. Rooting.

RADICEL, RADICELLA. A minute root; a rootlet. The tiny roots which appear on a young plant at the time of germination.

RADICIFLOROUS. Apparently flowering from the root.

RADICLE. The first root of a plant, rudimentary in the embryo.

RADICOSE. Having a large root.

RADISH (*Raphanus sativus*). A hardy annual, cultivated from a very early period, principally for the use of its fleshy roots in salad preparations; the seed-

Radish—*continued.*

pods are also sometimes used for pickling, when they are young and green. Radishes are very popular, and much esteemed for salading, especially in spring and during early summer, when they grow quickly. They are only really tender and fit for eating during a limited period, from the time the roots are large enough to use until the tops form a few rough leaves, and show signs of starting a flower-stem. At this stage, the roots become stringy, and have a hot flavour. The chief point in the culture of Radishes for maintaining a supply is that of sowing a small quantity frequently, to insure a succession. Few plants are more easily grown, or arrive more quickly at a stage ready for use. The early spring supplies are generally grown in frames by themselves, or along with Asparagus or Potatoes that are being forced. A slight bottom heat, from fermenting material, is sufficient to insure germination; afterwards, air must be admitted as the weather permits—a temperature of 50deg. in the frame is ample. The seeds are generally best sown broadcast, either in frames or the open ground, except those intended for winter consumption, which may be placed in shallow drills, 6in. or 8in. apart. Sowings may be made in warm positions outside early in the year, for the purpose of obtaining crops to be used along with, or independent of, those from frames. From January to April, the young plants will require protection during frosty and any unfavourable weather: this may be afforded by bending sticks over and laying mats upon them. From March onwards, sowings should be made outside about every fortnight, supposing the produce is required: this insures a succession. Radishes succeed in any light soil; it should be dug deeply, and be raked fine on the surface before the seeds are sown. Winter Radishes require to be sown in July or August, and the plants thinned afterwards to about 4in. apart. For summer, a cool, shady position should be selected; a warm, sheltered situation is best suited at all other seasons. Birds are very fond of Radish seed; consequently, it must be protected for a time, wherever sown. Throughout summer, the young plants require frequent waterings: if this is neglected in dry weather, they soon run to seed, and the roots are then of no use.

FUNGI. The Fungi parasitic on Radishes call for but a short notice, since only one or two of them ever do much damage; and all of them grow also on other cultivated *Cruciferæ*, including Cabbages and Turnips. The worst are the White Rust (*Cystopus candidus*) and Mildew (*Peronospora parasitica*). The former produces white patches on the leaves, and also grows on and deforms the flowers, causing an enlargement of all their parts, and rendering them sterile (*see* **Rusts**). The Mildew (*see* **Peronospora**) is much less noticeable in its effects, but is not less hurtful to the plants.

INSECTS. Radishes are apt to suffer from the ravages of the same insects as feed on Turnips. Roots of Radishes are eaten by the usual subterranean foes that attack other fleshy roots. Among these are *Julus* and other **Millipedes** (which *see*), and the larvæ of certain *Noctuæ*, or Night Moths. The most dangerous of the foes that live on the roots are the larvæ of several species of flies that belong to the same genus as the **Onion Fly** (which *see*). All of these larvæ eat the roots of other *Cruciferæ* also, *e.g.*, Cabbage; but one species (*Anthomyia radicum*) has received the name of Radish Fly, from its preference for this plant. This fly is very common throughout the summer. Its body is about ⅛in. long, and its spread of wings from ¼in. to ½in. The body is covered, not very thickly, with stiff hairs. The male has the thorax black, with two short, grey, narrow stripes lengthwise; the abdomen is grey, with a black line down the middle and three black lines across it; the forehead is white, with a black, triangular spot; the face is whitish-ochreous; the legs and antennæ are black; the wings

Radish—*continued.*

are transparent, and the third and fourth veins in each converge slightly. The female differs from the male in the broader body, and the ash-grey colour; the stripes on the thorax are faint-coloured, and there is only a slender, dark line down the middle of the abdomen. The larvæ have neither head nor limbs, but are blunt behind, and taper to a point in front. They are yellowish, fleshy, and wrinkled. On the blunt hinder end are several fleshy lobes, and breathing-pores in two groups of three each. The larvæ eat into the roots, and cause them to rot. When full-fed, they leave the roots, and change, in the soil, into dull ochreous pupæ of the form

FIG. 347. CHINA ROSE RADISH.

usually met with in *Diptera*. The larvæ of *Anthomyia floccosa*, Macq. (? *A. floralis*, Fall.), also feed in the roots of Radishes, Cabbages, and allied plants, as do likewise the larvæ of *A. Brassicæ* (*see* **Cabbage Fly**) and of *A.* (*Homalomyia*) *canicularis*; and those of *A. Raphani* feed on Radishes in North America. All of these insects are very like the Radish Fly, and it is unnecessary to describe them, since the habits of all are much the same in all stages. The larvæ have been found in large numbers feeding in dung, and the insects have been reared from this. It has also been observed that when ground is manured with farmyard dung, the root-crops are apt to suffer from the attacks of larvæ of these flies.

Remedies. The most effectual seems to be crude carbolic acid, in solution. Successful results have followed its use, in the strength of half a pint of acid mixed with one gallon of boiling water, to which about a quart of soft soap has been added. This should be diluted with fifty gallons of water; or it may be used even in a weaker solution. The plants should be watered with this fluid every week, after they appear above ground. Instead of this, much-diluted gas-water may be used; or gas-lime may be sprinkled along the rows. Farmyard manure is not safe, if there are maggots in it; mineral manures may be substituted in their stead.

Radish leaves are occasionally eaten by larvæ of the White Butterflies (**Cabbage Caterpillars**), and of various Moths (**Mamestra, Plusia, Potherb Moths**), as well as by the **Turnip Flea** (*Phyllotreta nemorum*), and by other small beetles allied to it. The seeds are destroyed in the fruits by larvæ of *Ceuthorhynchus*

Radish—*continued.*

assimilis (**Turnip-seed Weevil**), which is closely allied to the Weevils that make galls on roots of Cabbage, Turnip, Charlock, and Wild Mustard. For the nature of the injuries in each case, and for the appropriate remedies, *see* the heading quoted for each.

SORTS. Of these there are many in commerce which may be classed as Long-rooted and Turnip-rooted varieties. There are also intermediate globular forms, and these are much esteemed. The following varieties are amongst the best:

BLACK SPANISH, an excellent hardy sort for autumn and winter use. CHINA ROSE, root oblong or somewhat conical, bright rose-coloured; also a fine variety for autumn and winter (see Fig. 347). EARLY FRAME (Wood's), one of the earliest, shorter than the LONG SCARLET, of which it is a sub-variety; fine for forcing. EARLY ROSE GLOBE, a very early and much-esteemed sort, of a fine,

FIG. 348. EARLY ROSE GLOBE RADISH.

clear rosy-scarlet, compact (see Fig. 348). FRENCH BREAKFAST, a beautiful olive-shaped variety, with white tip, of quick growth, and very mild flavour; one of the best for forcing and summer use. LONG SCARLET, SHORT-TOP, one of the best and most esteemed long varieties, because of its bright colour; much cultivated for market. OLIVE SCARLET, an excellent sort, of quick growth and fine colour. RED TURNIP-ROOTED, crisp, and of mild flavour; very extensively grown for market, and well adapted for general summer use, because it withstands dry weather. WHITE TURNIP-ROOTED has a white skin, but otherwise differs very little from the red variety; it is equally good, but the colour of the latter is generally preferred.

RADIUS, RAY. The circumference of the circle formed by umbels or heads, or of other such parts.

RADIX. The root; the descending axis; that part which is the development of a radicle. It differs from a stem, not only in its origin, but in not branching symmetrically, and in having no normal leaf-buds.

RAFFIA OR ROFFIA PLANT. *See* **Raphia Ruffia** and **R. tædigera.**

RAFNIA (named in honour of C. G. Rafn, a Danish botanist, who wrote a Flora of Denmark, in 1796). ORD. *Leguminosæ*. A genus comprising twenty-two species of glabrous, and often glaucous, greenhouse shrubs or sub-shrubs, confined to South Africa. Flowers yellow, solitary or shortly racemose, terminal or in the axils of bracts; calyx unequally five-cleft, the lowest segment narrowest; corolla glabrous; standard roundish; keel incurved, rostrate or obliquely truncate. Pods linear or lanceolate. Leaves simple, entire, one-nerved or reticulate-veined. The species, a selection of which is given below, thrive in a compost of fibry loam and sandy peat, with the addition of pieces of charcoal and broken pots, to keep the whole rough. Attention to drainage is an important point. Propagation may be effected, at the beginning of summer, by cuttings of firm side shoots, inserted in sand, and covered with a bell glass; or, in spring, by seeds, sown on a hotbed.

R. angulata (angular-branched). *fl.*, upper and lateral calyx lobes nearly as long as the calyx tube or somewhat longer; flowering branchlets forked. May. *l.* ¾in. to 1¼in long, oblong-

Rafnia—*continued.*

cuneate, lanceolate, linear-lanceolate, or linear-filiform, sub-obtuse or acute. Branchlets angular. *h.* 1ft. to 1½ft. 1816. Sub-shrub. SYN. *R. filifolia.*

R. elliptica (elliptic-leaved). *fl.*, peduncles axillary, one-flowered, with a pair of leafy bracts under the flower. June. *l.* 2in. to 3in. long, broadly obovate, elliptical, oblong, or ovate-lanceolate, acute or obtuse and mucronate; upper ones narrow and more lanceolate, all narrowed at base. Branches angular. *h.* 1ft. to 3ft. 1819. Shrub.

R. filifolia (thread-leaved). A synonym of *R. angulata.*

R. triflora (three-flowered).* *fl.*, keel about twice as long as the calyx tube; peduncles axillary, one to three together, leafless, or branched and leaf-bearing. June. *l.* 1½in. to 3in. long, roundish-obovate, elliptical or ovate-lanceolate, acute or mucronulate, obtuse at base. Branches angular or two-edged. *h.* 2ft. to 4ft. 1784. Shrub. (B. M. 482, under name of *Crotalaria triflora.*)

RAGGED ROBIN. *See* **Lychnis Flos-cuculi.**

RAGWEED, or **RAGWORT.** *See* **Senecio Jacobæa.**

RAGWORT. *See* **Othonna.**

RAILLARDIA (named in honour of A. M. L. Raillard, an officer in the French Marine service). ORD. *Compositæ.* A genus comprising nine species of greenhouse shrubs, confined to the Sandwich Islands. Flower-heads yellow, rayless, mediocre or small, racemose or corymbose at the apices of the branches; involucre cylindrical or narrow-campanulate, with one series of connate or at length free bracts; receptacle small, convex or sub-cònical, naked or setose-fimbrilliferous; achenes narrow, glabrous, or slightly pilose. Leaves opposite, ternately whorled, or alternate, sessile, entire, coriaceous, at length shining. For culture of the only species introduced—now probably lost to gardens—*see* **Senecio.**

R. ciliolata (fringed-leaved). *fl.-heads* five to eight, clustered in a paniculate corymb; achenes sub-tetragonal, attenuated at base. July. *l.* ternately whorled, lanceolate, glabrous on both sides, rather more than ¼in. long, shortly ciliated on the margins. Branches velvety-pubescent. *h.* 2ft. 1865. (B. M. 5517.)

RAIN. A familiar example of the origin and nature of Rain is seen in the formation of a miniature shower, when steam escapes from a steam-engine into the air. When water is heated, it becomes an invisible vapour; and this rises, and mixes with the air, if the air is warm. When the warm air, full of water in this state, mixes with cold air, or touches any cold object, the vapour returns to the state of water; but, for a time, it remains in the form of very small particles, like fine dust—so light, that they can still float in the air. In this state, they form clouds when high above the earth, or mist when lying close to the earth. Among mountains, clouds and mists are often seen to be directly continuous. But mists often cling to the mountain-tops while the sky is nearly cloudless. This is owing to the rocks and soil being colder than the air, and causing the vapour to become visible as mist, by cooling the air near them below the temperature at which the water can remain vapour. As the wind carries the mist from the mountain into the warmer air around, it resumes the form of vapour, and becomes invisible; but new mist is formed, and supplies the place of that carried away, so that the mist seems to remain unchanged on the peaks for hours. Clouds form and disappear in the sky according as the air filled with vapour meets colder or warmer winds. When the minute drops of water that form clouds are very crowded, they join together, and form drops, too large to be supported in the air. These then fall as Rain. Sometimes, a cloud will be seen raining high up in the sky, though Rain does not reach the ground. This happens when the Rain has to fall through a layer of warm, dry air, in which it is all turned into vapour again. Light Rain sometimes falls out of a sky cloudless or nearly so; but this is a rare occurrence. The greater amount of rainfall during the night is due to the cooling of the air when the sun's heat is withdrawn. The vapour

Rain—*continued.*

forms drops of water, and falls as Rain. The sources of the vapour in the air are various. Much of it is given off by growing plants, and a little by animals. More is taken up by warm, dry winds blowing over the surface of the land, with its marshes, rivers, and lakes; but most of all is absorbed by the winds in passing over the oceans, such as the Atlantic Ocean. Such winds are saturated, or nearly so; that is, they carry away as much vapour as they can dissolve at the temperature they had while passing over the water. If this is higher than that of the land at which they first arrive, they will give up, as Rain, the vapour that no longer can be dissolved when the temperature falls. Hence, countries near oceans receive more Rain than those at a distance from them in the middle of continents. Mountainous countries near the sea are especially rainy, since air becomes colder the higher it rises along the slopes, and a very great part of the vapour is thus lost. For the reasons just stated, as well as from local peculiarities of situation, the frequency and amount of the rainfall varies widely in different localities, and at different seasons. The total amount of Rain that falls in any given time is measured by means of instruments (*see* **Rain-gauge**). Careful observations have been carried on in many countries, and in many localities, for a considerable number of years, as to the total amount of Rain that falls during the year, as well as during the various periods of the year, in each locality. The amount is expressed in the number of inches in depth that the Rain would reach in any given time, if it could all be confined to the exact area on which it has fallen.

It has been found that, in some countries in the tropics, *e.g.*, in Upper Egypt and the Sahara Desert, and on part of the coast of Peru, little Rain, if any, falls. On the other hand, the heaviest recorded rainfall occurs among mountain ranges in the neighbourhood of tropical oceans. Thus, in the Himalaya Mountains, about 100 miles from Calcutta, a rainfall of about 524in., or about 44ft., has been observed within a year. In the British Islands, the rainfall is considerably greater on the west side than on the east, the winds from the Atlantic Ocean losing much of their vapour among the mountains. The heaviest rainfall in Britain is recorded from the Cumberland mountains, near Keswick, where over 150in., or 12½ft., of Rain has been collected in a year. Along our western coasts, the average annual rainfall varies from about 36in. to 66in., and on the eastern side of our islands, from about 20in. to 30in.

But the actual rainfall does not bear any definite relation to the number of rainy days in a year, for often the heaviest fall is met with in districts where it is almost limited to certain seasons. When much Rain falls in a limited time, the greater part of it necessarily flows off the surface of the ground, and it is apt to carry away the fertile soil, and to cause disastrous floods. Where, on the other hand, the period during which it falls is more prolonged, the Rain sinks into the soil, and supplies the underground reservoirs of springs.

In passing through the atmosphere, the rain becomes of the same temperature, and, as this in summer is almost always higher than that of the soil, the latter becomes warmed, and the plants in it are stimulated to more active growth. Moreover, the rain-water has oxygen, and, it may be, also minute traces of ammonia and of nitric acid, obtained from the atmosphere, dissolved freely in it, and these also are beneficial, as food, to the roots of plants. It is unnecessary to dilate on the importance of a good supply of water in the soil, insured to plants by regular Rains.

Rain-water is very generally preferred for watering plants in pots, and it has the great advantage over

Rain—*continued.*

that drawn from springs, or from underground pipes, of usually being at the temperature of the air, and of containing in it the oxygen, and other substances, mentioned above. Its use is of course similar, in its effects, to the watering of plants by Rain in the open air and, when rain-water can be had, the employment of it is therefore to be recommended.

RAIN BERRY. *See* **Rhamnus catharticus.**

RAINBOW FLOWER. A common name for the genus *Iris*.

RAIN-GAUGE. This is an instrument for measuring the amount of rain that falls in any place in any given time. Various forms are used, but all are much alike in essential points. In all there must be a collecting surface of known size. This is generally a brass funnel, with an upright rim about 1½in. high around it, to prevent the drops from splashing over the edge. The rain-water runs down a tube into a receiver, which is protected from any water getting into it, except by the tube, and prevents the water in it from evaporating. At certain hours, the amount of water in the receiver is poured into a graduated vessel, and is carefully measured. Each mark on the measure represents, usually, $\frac{1}{100}$in. of rainfall. The receiver is generally made to hold 3in. depth of rainfall. The collecting funnel may be of any size, so long as accurately known; but 5in. is the common diameter. The funnel must be placed absolutely horizontal, and should stand in the middle of an open piece of ground, in order to avoid eddies. The rim should be at least 6in. above the surface on which it stands; but it ought not to be raised much, as, other conditions remaining the same, the higher the gauge stands, the less rain it catches. Snow must be melted, and measured as water, in calculating the total annual rainfall. Very slight showers cannot be measured, as the rain-drops evaporate from the funnel without running into the receiver; hence, the record may be rather low, if such showers are frequent.

RAISIN-TREE, JAPANESE. A common name for *Hovenia dulcis*.

RAJANIA. A synonym of **Akebia** (which *see*).

RAKES. These are indispensable in gardens, for levelling ground previous to seed-sowing, for collecting weeds, grass, leaves, &c., and for various other purposes. There are different sorts: some have the heads made of iron, others have wooden heads, into which iron teeth are driven, and others are made solely of wood, the same as used for hay-making. What is known as a set of iron Rakes should be at command in gardens of extent—that is, sizes with heads varying in length; as, for instance, one should be 6in., another 8in., and so on. A very useful size, for collecting weeds, levelling

FIG. 349. IRON RAKE.

seed-beds, &c., is represented in Fig. 349. Wooden Rakes, of the ordinary make, are best adapted for raking over uncropped ground, for levelling gravel in walks, and for collecting grass and leaves from lawns; one or more of these may, therefore, be kept almost in constant use. Rakes with wooden handle and bar and iron teeth, are suitable for breaking up lumps of soil, where wooden teeth would soon become mutilated. Daisy Rakes have broad teeth, sharpened on both edges; they are used for removing Daisy flowers, &c., from lawns.

RAMAL, RAMEAL. Of, or belonging to, a branch.

RAMENTA. Thin, chaffy scales, with which the stems of some plants, especially Ferns, are covered.

RAMENTACEOUS. Covered with ramenta.

RAMIFICATION. Sub-divisions of root, branches, leaves, or panicles.

RAMIFLOROUS. Flowering on the branches.

RAMMERS. Rammers are in frequent requisition in gardens, more particularly through the autumn and winter, when transplanting and various alterations are in progress. They are required for consolidating the earth about newly-transplanted trees, also round posts, &c. In the formation of new walks, and when laying turf, a Rammer is necessary for rendering the ground beneath firm and solid. A handy form of Rammer is that having a cast-iron head, with a socket for inserting a wooden handle. Those generally seen are made of wood, tapering from a circular base upwards, and provided with handles for lifting. Hand Rammers may readily be made from any hard piece of prepared wood, such as an old spade-handle. They are indispensable when potting plants that require the soil to be very firm round their roots.

RAMONDIA (named in honour of L. F. Ramond, a French botanist and traveller, who died in 1827). SYNS. *Chaixia, Myconia.* ORD. *Gesneraceæ.* A genus comprising three species of hardy, stemless herbs; one is a native of South Europe, the second is Siberian, and the third is an inhabitant of Greece, &c. Calyx free, with four, five, or rarely six ovate or oblong segments; corolla violet or pale purplish, with a rotate or broadly campanulate tube, and four, five, or rarely six broad, imbricating lobes; stamens affixed to the base of the corolla; scapes leafless, one or few-flowered. Leaves radical, softly rugose. Only two species are in cultivation. *R. pyrenaica* is a very pretty little alpine plant, admirably adapted for cultivating in fissures of rockwork, or for pot culture in cold frames. In thrives in well-drained peaty soil, and may be increased by seeds, or by division. *R. serbica* requires similar treatment.

R. pyrenaica (Pyrenean).* Rosette Mullein. *fl.* purple; calyx and corolla five-parted, the latter with sub-obovate lobes; scapes many, several, or rarely one-flowered. May. *l.* rosulate, ovate, deeply toothed, hirsute with long, rufous hairs. *h.* 3in. Pyrenees, &c., 1731. (R. G. 703.) SYN. *Verbascum Myconi* (B. M. 236). There is a white-flowered variety of this in cultivation, but it is yet very rare in gardens.

R. serbica (Servian). *fl.*, corolla yellow, campanulate, parted to the middle in four obovate, sub-equal segments; scape one or two-flowered, ebracteate. *l.* rather thick, ovate, entire, obtuse, shortly attenuated at base, white-silky above, ferruginously woolly beneath, 1in. long. Thessaly. SYN. *Jankœa Heldreichii.*

RAMOSE. Branched or branching.

FIG. 350. RAMPION.

RAMPION (*Campanula Rapunculus*). A hardy biennial, cultivated for the use of its fleshy roots in salads, either boiled or in a raw state, generally the latter; the leaves are also used in winter salads. It

Rampion—*continued.*

is raised from seeds, which are very minute, and should be sown in very shallow drills, 6in. apart, not earlier than about the end of May, lest the plants run to seed before winter. Rampion is not extensively cultivated. It prefers a rather shady situation, and rich, light soil. The seeds should only be covered very slightly. Frequent waterings are necessary until the plants are established. When they are large enough to handle, thin out to 4in. apart. The roots, which are fleshy and white, will be fit for use from November through winter; they require scraping before being eaten. See Fig. 350.

RAMPION, HORNED. *See* **Phyteuma.**

RAM'S FOOT. An old name for *Ranunculus aquatilus.*

RAM'S HEAD. A common name for *Cypripedium arietinum.*

RAM'S HORNS. A common name for *Orchis mascula.*

RAMSONS. *See* **Allium ursinum.**

RAMULARIA. A group of Fungi, parasitic on various parts of living plants. The species are numerous; but almost all of them cause brown or pale spots on the leaves or other green organs, and their effect is thus conspicuous, though very seldom so hurtful as to cause serious injury to the plants. The mycelium is inside the host-plant; and from it, at each stoma, are pushed out several erect branches (conidiophores), which, at the tip, or near it, bear conidia, or spores. These are nearly cylindrical, but taper at both ends, and are divided by two or more cross-walls into several cells. It is probable that the Fungi grouped under *Ramularia* belong to the reproduction of **Pyrenomycetes** (which *see*). To enumerate the species that affect cultivated plants is unnecessary, since probably few flowering plants are quite free from the attacks of some Fungus of the group to which *Ramularia* belongs. No known remedy is so effectual as burning the more diseased plants or leaves. Fortunately, these Fungi seldom commit very serious depredations on cultivated plants.

RAMULOSE. Bearing many branchlets or twigs.

RANARIA. A synonym of *Herpestis.*

RANCAGUA. A synonym of **Lasthenia** (which *see*).

RANDALIA. A synonym of *Eriocaulon.*

RANDIA (named in honour of Isaac Rand, formerly Præfectus of the Botanic Garden of the Society of Apothecaries at Chelsea). SYNS. *Cupia, Oxyceros, Stylocoryne.* ORD. *Rubiaceæ.* A genus comprising about ninety species of erect or climbing, unarmed or spiny, stove, evergreen trees or shrubs, allied to *Gardenia*, inhabiting tropical regions, mostly in Asia and Africa. Flowers white or yellow, rarely pink, small or large, solitary, corymbose or fascicled, axillary, very rarely terminal; calyx tube ovoid, obovoid, or turbinate, the limb usually tubular, rarely toothed or lobed; corolla funnel-shaped, campanulate, or hypocrateriform, with a short or elongated tube, a glabrous or villous throat, and a limb of five (rarely more) acute or obtuse, twisted lobes; stamens five. Leaves obovate, oblong, or lanceolate, usually coriaceous. A selection of the introduced species is here given; they are shrubs, except where otherwise indicated. For culture, *see* **Gardenia.**

R. aculeata (prickly). Indigo Berry. *fl.* white, axillary, sessile, solitary, hypocrateriform; corolla tube twice as long as the calyx teeth. July. *fr.* the size of a small cherry. *l.* obovate, highly glabrous, sub-sessile, cuneate at base. Branchlets glabrous; spines rigid, opposite the axils, spreading. *h.* 12ft. West Indies, 1733. SYN. *Gardenia Randia* (B. M. 1841).

R. dumetorum (bushy). *fl.* white, at length yellow; calyx tube longer than the lanceolate corolla lobes; corolla silky outside. July. *fr.* large, ovate-cordate, shining. *l.* opposite or fasciculate, obovate-cuneate, smooth. *h.* 5ft. East Indies, 1825. A much-branched shrub or small tree, with axillary, rigid spines. SYN. *R. floribunda.*

R. fasciculata (fascicled). *fl.* white, sweet-scented, at length yellowish; fascicles sub-sessile. July. *l.* ovate-oblong, sub-sessile, smooth. *h.* 4ft. East Indies, 1824. A much-branched shrub, with axillary, spreading spines.

R. floribunda (bundle-flowered). A synonym of *R. dumetorum.*

R. horrida (horrid). *fl.* white, in trichotomous, sub-terminal racemes. May. *fr.* black. *l.* ovate-lanceolate, glabrous. Branches reclinate; branchlets decussate; spines large, opposite, horn-like. *h.* 5ft. Cochin China, 1825.

R. macrantha (large-flowered).* *fl.* pale yellow, axillary or terminal on the ultimate branchlets, solitary; calyx lobes somewhat leaf-like; corolla tube very long. June. *l.* obovate-oblong, acuminate, shortly petiolate, membranous, obsoletely pubescent beneath and on the veins. *h.* 9ft. to 30ft. Brazil, 1815. Unarmed climbing shrub or small tree. (B. M. 3809, under name of *R. Bowieana*; B. R. 1846, 63, under name of *Gardenia Devoniana.*)

R. maculata (spotted).* *fl.* white; corolla almost glabrous or scarcely puberulous, with a very long tube. April. *l.* subcoriaceous, shining, highly glabrous, oblong, very shortly petiolate. Sierra Leone, 1843. A small, unarmed, highly glabrous tree. (B. M. 4185, under name of *Gardenia Stanleyana.*)

R. malleifera (hammer-bearing). *fl.* white, solitary, terminal, tomentose; corolla tube cylindrical, club-shaped, expanded into a broad, funnel-shaped limb. July. *l.* ternate, obovate, cuspidate, cuneate at base, shortly petiolate, highly glabrous. *h.* 4ft. to 6ft. Sierra Leone, 1843. SYNS. *Gardenia malleifera* (B. M. 4307), *G. Whitefieldii.*

R. rotundifolia (round-leaved). *fl.* white, solitary, sessile; corolla twice as long as the calyx. July. *fr.* yellowish. *l.* subrotundate or ovate, pubescent on both sides, wrinkled. Branches and spines sub-verticillate. *h.* 6ft. Peru, 1820.

RANUNCULACEÆ. A natural order of herbs, rarely shrubs or woody climbers, dispersed over nearly the whole of the globe. Flowers regular or rarely irregular, hermaphrodite or by abortion dicœcious; inflorescence usually terminal, racemose or paniculate; sepals three to many, usually five, hypogynous, free, commonly petaloid and deciduous, imbricated or valvate; petals as many as the sepals, or numerous, sometimes flat and conspicuous, sometimes small, deformed, or even absent, imbricated; stamens usually numerous and many-seriate, hypogynous, free; anther connectives continuous with the filaments; carpels many or rarely solitary, free or rarely sub-connate. Fruit of pointed or feathery achenes, or of follicles, which are rarely united into a capsule. Leaves radical or alternate (in *Clematideæ* opposite) entire or palmately or sub-pinnately dissected; petioles often dilated, amplexicaul or rarely furnished with stipuliform appendages. Most of the *Ranunculaceæ* possess acrid, and more or less poisonous, but nevertheless volatile, properties. The juice of the leaves of *Clematis Vitalba* is employed by beggars for producing artificial sores. Several species of *Helleborus* possess purgative and poisonous properties. The narcotic and poisonous characters of the Aconites are well-known. The order comprises thirty genera, and upwards of 1200 species have been described, many of which are highly ornamental garden plants. Examples: *Aconitum, Anemone, Clematis, Delphinium, Pæonia,* and *Ranunculus.*

RANUNCULUS (a Latin name for a little frog; applied by Pliny to these plants, the aquatic species growing where frogs abound). Buttercup; Crowfoot. Including *Ceratocephalus* and *Ficaria.* ORD. *Ranunculaceæ.* A large genus (about 160 species) of mostly hardy annual herbs (or at length often having perennial stems), dispersed over the whole globe, but most copious in temperate and frigid regions, particularly in the Northern hemisphere; within the tropics, a few only are found, and these on the tops of mountains. Flowers white, yellow, or red, terminal, solitary or paniculate, rarely sessile in the axils of the branchlets; sepals three to five, caducous; petals equal in number, or more (sometimes as many as fifteen), with a nectar-bearing scale at the base, conspicuous or rarely minute; stamens

Ranunculus—*continued.*

shorter than the sepals and petals, often numerous, very few in some few-flowered species; achenes compressed or sub-globose, smooth or variously striated, ribbed, wrinkled, or bristly. Leaves entire or dissected; those at the divisions of the stem often small. According to Hooker, sixteen species are included in the British Flora; some of these, although common weeds, are pretty objects when in flower, and hence are described below. Except where otherwise stated, all the species here mentioned are hardy. Nearly all are of easy culture in mixed borders, or in rock gardens; they usually prefer rather moist situations and loamy soil. *R. asiaticus* has long been in cultivation. This species and its numerous varieties require special and very different treatment from any of the others, but whenever the plants succeed and flower, their beauty will be sure to compensate for any extra attention bestowed. Propagation is effected by seeds, and by division.

For the varieties of the garden Ranunculus (*R. asiaticus*) special beds should be prepared by taking out the ordinary soil to a depth of about 1½ft. to 2ft., placing some drainage in the bottom, if there is a suspicion of stagnant moisture, and filling up with a prepared compost. This should consist of two parts loam to one of leaf soil and thoroughly decayed cowdung. Plenty of sharp, river or road sand should be intermixed, the compost prepared, and the beds made up some time, if possible, before planting time. The safest time to plant is towards the end of February, should weather permit; autumn planting is sometimes practised, but it is unsafe, because of the roots being liable to perish through winter. The soil must be rendered fine on the surface, and raised a little above the edges. The roots, which are small and some-

FIG. 351. ROOT OF GARDEN RANUNCULUS.

what like small claws (see Fig. 351), may be inserted about 6in. apart, and all placed at an equal depth of 1½in. or 2in. The claws must be set downwards, and pressed firmly in place; afterwards, a little sand should be scattered in, and then covered with fine prepared soil. When the flowers begin to expand, it is advisable, if convenient, to place a light awning over them, to afford shade and shelter; but this is not absolutely necessary. Should the weather be dry, water must be supplied in sufficient quantity to prevent the soil cracking; it should be given at intervals in the evening. The Ranunculus likes plenty of moisture, but over-abundant supplies generally cause the leaves to turn yellow and die off prematurely; a top-dressing of leaf mould or cocoa-nut fibre is of great service in retaining moisture. So soon as the leaves ripen and turn yellow, after flowering is over, the tubers should be lifted and stored away in a dry, airy compartment, in drawers, or suspended in paper bags, until planting time again arrives. This lifting of the roots at the proper time is a most important part of the management. There are two principal sections of the garden Ranunculus; one is known as the Persian, and the other the Turban. Varieties of the first-named are very compact and symmetrical in habit, and all their flowers are

Ranunculus—*continued.*

very beautiful. The Turban forms are somewhat coarser in growth, but are of hardier constitution than the Persian. There are not so many varieties of these, but they are well adapted for massing in beds and borders. Collections of varieties are usually selected and sent out by nurserymen and bulb merchants; it is, therefore, unnecessary to enumerate descriptions.

FIG. 352. RANUNCULUS ACONITIFOLIUS FLORE-PLENO, showing Habit and detached Single Flower.

R. aconitifolius (Aconite-leaved).* *fl.* white, few or numerous; calyx pressed, smooth; petals oblong, cuneated, or orbicular. May and June. *l.* palmately three to five-parted, with the partitions deeply toothed; upper leaves sessile, cleft into linear-lanceolate lobes. Stem branched. *h.* 6in. to 2ft. Europe, 1596. The flowers of varieties of this species are known in gardens by the name of White Bachelors' Buttons. The double-flowered form is the most ornamental, and is generally known in gardens under the names of Fair Maids of France and Fair Maids of Kent. See Fig. 352. (B. M. 204.)

FIG. 353. RANUNCULUS AMPLEXICAULIS.

R. acris (sharp). Common Buttercup; Gold Knots. *fl.* yellow, 1in. in diameter; sepals and petals spreading, the former pubescent; peduncles not furrowed. April to September. *l.* usually all petiolate, orbicular or five-angled in outline, three to seven-parted, the uppermost ones sessile; segments of lower leaves cuneate, deeply cut and lobed, those of the upper ones

Ranunculus—*continued.*

linear and entire. Stem erect. Rootstock straight. *h.* 8in. to 3ft. Europe (Britain), North Asia. Plant hairy. (Sy. En. B. 33.) A double-flowered form of this species—Yellow Bachelors' Buttons—is figured in B. M. 215.

R. alpestris (alpine). *fl.* white, varying in size, either single or double, usually one to a stem; petals five, obcordate or three-lobed. June to August. *l.* orbicular-cordate, three-lobed, with the tops deeply crenate at the apex, blunt; sometimes the leaves are trifid, or hardly so. *h.* 3in. to 6in. Pyrenees, &c.

R. amplexicaulis (stem-clasping).* *fl.* snowy-white under cultivation, seldom double; scapes and peduncles smooth. April and May. *l.* oval-lanceolate, acuminate, stem-clasping, smooth, or with a few deciduous hairs on the edges, glaucous. Stems three to six-flowered. *h.* 3in. to 9in. Pyrenees and Western Alps, 1633. See Fig. 353. (B. M. 266; G. C. n. s., xix. 788; R. G. 1885, 244.)

R. anemonoides (Anemone-like).* *fl.* white, tinted with pink, pale outside, large, and rather attractive, borne on peduncles 3in. to 6in. high. Summer. *l.* glaucous-green, biternately divided, the segments cut into linear divisions. Styrian Alps, &c., 1883. A charming little plant.

R. aquatilis (aquatic). Lodewort; Ram's Foot, &c. *fl.* white; peduncles usually leaf-opposed, one-flowered. May to August. *l.*, floating ones three-lobed, or parted or absent; submerged ones di- or trichotomously multifid, the segments capillary or linear; stipules broad. Temperate regions (Britain). A very variable plant, of which the following are enumerated, by Hooker, as sub-species: *circinatus*, *fluitans*, *heterophyllus*, *pantothrix*, and *tripartitus*.

FIG. 354. RANUNCULUS ASIATICUS FLORE-PLENO.

R. asiaticus (Asiatic).* Common Garden Ranunculus. *fl.* variable in colour; calyx spreading, afterwards reflexed; petals large, obovate, very blunt. May and June. *l.* ternate or biternate; segments toothed or deeply trifid. Stem erect, simple or branched at the base. *h.* 9in. Levant, 1596. Under cultivation, this has nearly always double flowers. See Fig. 354.

R. a. sanguineus (bloody).* Turkey Ranunculus. *fl.* purple, yellow, orange, and variegated with the same colours, excluding all colours verging on white or blue, always double. *l.* ternate; segments toothed, obtuse. Stem simple.

R. a. tenuilobus (slender-lobed). *fl.* white, yellow, rarely purple. *l.* multifid, with linear, acute lobes. Stem somewhat branched.

R. a. vulgaris (common). Persian Ranunculus. *fl.* of all colours (blue excepted), and variegated, double or single. *l.* ternate; segments trifid, acute. Stem branched at the bottom. A very ornamental plant, having innumerable forms in gardens.

Ranunculus—*continued.*

R. bulbosus (bulbous-rooted). Cuckoo Buds; Gold Cup. *fl.* yellow, with furrowed peduncles, reflexed sepals, and hairy receptacle. Spring and early summer. *l.* trifoliolate or ternatisect, hairy; segments lobed. *h.* 1ft. Europe, Asia, North Africa. (Sy. En. B. 35.)

R. cardiophyllus (heart-leaved). *fl.* golden, large; calyx spreading, half as long as the corolla. May. *l.*, radical ones roundish-cordate, crenate and multifid; cauline ones palmately multifid: lobes linear, deeply crenate. *h.* 1ft. North America, 1829. Plant pubescent, hairy. (B. M. 2999.)

R. cassubicus (Cassubian). *fl.* yellow; calyx pubescent, shorter than the petals. June and July. *l.* smooth; radical ones stalked, kidney-shaped, crenate; cauline ones divided into linear, serrated lobes. *h.* 6in. Northern and Eastern Europe, &c., 1794. (B. M. 2267.)

R. cortusæfolius (Cortusa-leaved).* *fl.* yellow; calyx spreading. May. *l.*, as well as the stem, slightly pilose; radical ones somewhat cordate-reniform, slightly lobed, broadly crenate; cauline ones sub-sessile, three to five-parted; floral ones lanceolate. Stem branched, corymbose. *h.* 2ft. Teneriffe, 1826. (B. M. 4625; L. J. F. iii. 293.)

R. creticus macrophyllus (large-leaved Cretan). *fl.* golden, large; calyx pressed. April and May. *l.* profoundly lobed, with slightly rounded teeth. Stem branched, many-flowered, and, as well as the leaves, slightly hairy. *h.* 1ft. Grecian Archipelago, 1658. (B. R. 1432.)

R. Ficaria (Figwort). Lesser Celandine; Pilewort. *fl.* bright yellow, about 1in. in diameter, sometimes apetalous; peduncles stout, axillary, one-flowered. March to May. *l.* variable, cordate, obtusely angled or crenate; petioles stout, dilated at base. Stem short, decumbent, branched at base. Europe (Britain, &c.). See Fig. 355. (Sy. En. B. 39.)

R. Flammula (Flammula). Lesser Spearwort. *fl.* yellow, rarely ¾in. in diameter; style of achenes short, obtuse. June to August. *l.*, lowest ones petiolate, ovate; upper ones more lanceolate and sessile. Europe (Britain). Plant prostrate or erect. (F. D. 572; Sy. En. B. 29.)

R. fumariæfolius (Fumitory-leaved). *fl.* yellow, always double; sepals ovate-oblong, spreading; scapes numerous, one-flowered, leafless or furnished with one multifid leaf about the middle, clothed with adpressed hairs. May to July. *l.* quite smooth, pinnate, many-parted; lobes oblong. *h.* 1ft. Native country unknown.

R. glacialis (glacier). *fl.* seldom double; petals white or reddish, suffused with purple, somewhat orbicular, bluntly emarginate, as long as the very hairy calyx. June to August. *l.* usually smooth, or the upper ones sometimes villous; radical ones stalked palmately three-parted or ternate, with trifid lobes and rather blunt lobules. Stem one to three-flowered. *h.* 3in. to 6in. Mountains of Europe, 1775. (F. D. i. 19.)

R. gramineus (grass-like).* *fl.* yellow; scales of petals tubular. April to June. *l.* lanceolate-linear, quite entire. Stems erect, quite smooth, with fibres at the neck, one to three-flowered. *h.* 6in. to 12in. South-western Europe, &c. (B. M. 164.) The variety *flore-pleno* has double flowers, and *phœnicifolius* has lanceolate leaves.

R. Heldreichianus (Heldreich's). *fl.* of a pale chrome-yellow, shining, numerous. Spring. *l.* tripartite, the lobes deeply incised. *h.* 1ft. Greece, 1882. An attractive plant, a sub-species of *R. Sprunerianus*.

R. isopyroides (Isopyrum-like). *fl.* white; petals five or sometimes more, twice as long as the smooth calyx, oval; peduncles two or three, rising from the axils of the upper leaves, or terminal. May and June. *l.*, radical ones pinnate, with stalked, twice trifid segments; cauline ones ternate. *h.* 3in. to 6in. Siberia, 1818.

R. Lingua (Lingua). Greater Spearwort. *fl.* yellow, handsome, 2in. in diameter, sub-panicled; sepals and petals five. July to September. *l.* 6in. to 10in. long, ¾in. to 1in. broad, sessile, half-amplexicaul, lanceolate, entire or toothed. Stem 2ft. to 3ft. high, hollow. Root densely fibrous. Europe (Britain, in marshes and ditches). (Sy. En. B. 31.)

R. Lyalli (Lyall's).* New Zealand Water Lily. *fl.* waxy-white, 4in. in diameter; sepals five, broad, pilose; petals broadly cuneate, with an obscure, oblong, basilar gland; peduncles very numerous, stout, erect. Spring and summer. *l.* peltate, on long, stout petioles, glabrous; limb orbicular, very concave, thick and coriaceous, sometimes 1½ft. in diameter, simply crenate. Stem paniculately branched, many-flowered. *h.* 2ft. to 4ft. New Zealand, 1879. A very handsome, erect, cool greenhouse plant. (G. C. n. s., xv. 724, and xxiii. 371.)

R. millefoliatus (thousand-leaved). *fl.* yellow; calyx pressed. May to July. *l.* decompound, multifid; lobes linear, smooth. Stem almost leafless, erect, villous, one-flowered. *h.* 1ft. South Europe, 1820. (B. M. 3009.) *grandiflorus* (S. B. F. G. ser. ii. 248) is a form with larger flowers.

R. monspeliacus (Montpelier). *fl.* yellow; calyx reflexed. April and May. *l.* woolly; radical ones three-lobed; lobes cuneate, trifidly toothed; upper leaves three-parted, with entire, linear lobes. Stem erect, few-flowered. *h.* 1½ft. Mediterranean region.

Ranunculus—*continued.*

R. m. cuneatus (wedge-shaped). *l.*, lobes wedge-shaped, trifidly toothed at the top. (S. B. F. G. ser. i. 94.)

R. m. rotundifolius (round-leaved). *l.* roundish, trifid; lobes toothed, obtuse.

R. montanus (mountain). *fl.* yellow, a little larger than those of *R. acris*; calyx smoothish; stigmas beautifully revolute. May to July. *l.*, radical ones smooth, three-parted, orbicular, with trifid, blunt segments; cauline ones sessile, three to five-parted into linear, quite entire lobes. Stem one-flowered, clothed with pressed pubescence at the top. *h.* 6in. Europe, &c., 1775. (B. M. 3022; J. F. A. 325, 326, under name of *R. nivalis.*)

R. parnassifolius (Parnassia-leaved).* *fl.* snowy-white or sometimes purplish, about the size of those of *R. amplexicaulis*; peduncles hairy. June and July. *l.*, radical ones stalked, rather heart-shaped, ovate-roundish; cauline ones sessile, ovate-lanceolate; footstalks much dilated at their base. Stem one to six-flowered. *h.* 3in. to 6in. Alps and Pyrenees, 1769. See Fig. 356. (B. M. 386.)

Ranunculus—*continued.*

R. spicatus (spike-flowered). *fl.* bright yellow, large, one to three to a stem. Spring. *l.* cordate-reniform or cordate-elliptic in outline, somewhat three-lobed, irregularly toothed. *h.* 1ft. Algeria, 1881. An ornamental plant, dying down early in summer, and appearing again in September and October. (B. M. 4585; F. d. S. 666; G. C. n. s., xv. 693.)

RAPANEA. A synonym of **Myrsine** (which *see*).

RAPATEACEÆ. A small natural order of perennial, usually tall, marsh, monocotyledonous herbs with short, thick rhizomes; they are found in Brazil or Guiana, extending a little way into Venezuela. Flowers hermaphrodite, regular, generally in dense, terminal heads, sessile or pedicellate, with many imbricate bracts; perianth inferior, six-parted, three outer leaflets calycine, three inner petaloid; stamens six, erect; ovary

FIG. 355. RANUNCULUS FICARIA.

R. pedatus (pedate-leaved). *fl.* yellow; calyx appressed. May and June. *l.* smooth; radical ones stalked, three-parted or pedate; lobes linear, entire or bifid; cauline leaves sessile, parted; uppermost ones linear. Stem erect, one to five-flowered. *h.* 1ft. Eastern Europe, 1806. (B. M. 2229.)

FIG. 356. RANUNCULUS PARNASSIFOLIUS, showing Habit and detached Single Flower.

R. repens (creeping). *fl.* yellow, 1in. in diameter; sepals spreading, hairy; petals generally sub-erect; peduncles furrowed. May to August. *l.* petioled, triangular or ovate, trifoliolate or ternately pinnatisect; segments variable, the middle one usually largest. Stem decumbent below, 8in. to 2ft. long, with long runners. Rootstock stout, short. Europe (Britain), Asia, &c. This is often a very troublesome weed. (Sy. En. B. 34.) *flore-pleno* is a double-flowered garden variety.

R. rutæfolius (Rue-leaved). *fl.* yellow; petals eight to ten, oblong, with an orange claw. May to July. *l.* pinnate, with three-lobed, multifid lobes. Stem generally one, rarely two or three-flowered. *h.* 3in. to 6in. Higher Alps (among rocks, near the limits of perpetual snow), 1759.

superior, sessile, included in the corolla tube; scapes erect. Capsules membranous or coriaceous, sessile. Leaves radical, broadly linear-lanceolate or oblong, often long, acuminate, petiolate or sessile in a sheath. The order comprises six genera, and about a score species, none of which are of much use or very ornamental. Examples: *Rapatea*, *Saxofridericia*, and *Spatanthus*.

RAPATEA PANDANOIDES. A synonym of **Saxofridericia regalis** (which *see*).

RAPE (*Brassica Napus*, a sub-species of *B. campestris*). A British, hardy biennial, sometimes grown in gardens, in a similar way to Mustard and Cress, for forming a small salad.

RAPE, BROOM. *See* **Orobanche.**

RAPHANISTRUM. Included under **Raphanus** (which *see*).

RAPHANUS (the old Greek name used by Theophrastus, connected with the Latin *rapum*). Including *Raphanistrum*. ORD. *Cruciferæ*. A genus comprising about half-a-dozen species of hardy, annual or biennial, branched herbs, natives of Europe and temperate Asia. Flowers white or yellow, purple-veined, slenderly pedicellate; sepals erect, lateral ones sub-saccate at base; racemes elongated, terminal and opposite the leaves, ebracteate. Pods elongated, erecto-patent. Lower

Raphanus—*continued.*

leaves lyrate. Root often succulent. *R. caudatus* furnishes long, edible pods. For culture and general remarks, *see* **Radish.**

R. caudatus (tailed). *fl.* purplish and veined, the size of those of the common Wallflower. May to August. Pods depressed, acuminated, longer than the whole plant. Stems purplish, with a glaucous hue, at first erect, then prostrate. Commonly cultivated in Western India, said to be a native of Java, 1815. Annual. (R. G. 594.)

R. sativus (cultivated). Common Garden Radish. *fl.* varying from white to pale violet, with strong, dark-coloured veins, moderate-sized, borne on a round, erect and branching stem, about 3ft. high. May. Seed-pods smooth, ending in a beak. *l.* rough, lyrate, or partly divided into transverse segments, the outer one largest and broadest. Root reddish-purple, white, yellowish, or deep brown, fusiform, semi-globular, or turnip-shaped. Annual. This is a native of temperate regions of the Old World, but, since remote historical times, it has been widely cultivated, and is now naturalised in many countries. Some botanists (Bentham, Hooker, and others) regard *R. sativus* as a form of *R. Raphanistrum.*

RAPHIA (from *raphis*, a needle; alluding to the beaked fruit). SYN. *Metroxylon* (of Sprengel). ORD. *Palmæ.* A genus comprising six or seven species of stove palms, unarmed or with armed sheaths; one is a native of America, from the mouth of the Amazon to Nicaragua, and the rest are found in tropical Africa and Madagascar. Flowers elongated, often decurved, long-exserted, on pectinate, compressed branchlets; common spathe none; partial ones numerous; spadices large, pendulous, cylindrical, densely much-branched, the branches imbricated, flabelliform, pectinate; bracts ladle-shaped, compressed, closely imbricated. Fruit large, oblong, ovoid, or ellipsoid, rostrate, one-valved, one-seeded, with ample scales, the spikes sometimes weighing from 200lb. to 300lb. Leaves terminal, long, sub-erect, equally pinnatisect; segments linear-lanceolate, acuminate, thickly coriaceous, recurved, bristly or slightly aculeate at base and on the margins; petioles cylindrical, or convex at back and flattened above; sheaths short, with long-fibrous margins. Trunk mediocre or tall, simple or dichotomously divided, densely annulate. Several of the species are grown in this country. For culture, *see* **Cocos.**

R. Ruffia. Raffia or Roffia Palm. *fr.* obovate or pyriform, mucronate, twelve (rarely thirteen to fifteen) sulcate; scales shining, deeply sulcate. *l.* 50ft. to 60ft. long. Caudex tall. Mascarene Islands.

R. tædigera (torch-bearing). Raffia or Roffia Palm. *fl.* greenish-olive, densely clustered; spadices very large, compoundly branched, and drooping. *fr.* 2½in. long, oblong, reticulated with large scales. *l.* 50ft. or more long, rising nearly vertically from the stem, and bending out on every side in graceful curves, forming a magnificent plume 70ft. high and 40ft. in diameter; leaflets spread out 4ft. on each side of the midrib, rather irregularly scattered, and not very closely set, drooping at the tips, and having weak spinules along the margins. Trunk generally 6ft. to 8ft. high, and about 1ft. in diameter, clothed for some distance down with the sheathing bases of the leafstalks. Amazon, 1847.

R. vinifera (wine-producing). Bamboo or Wine Palm. *fr.* linear-oblong, slightly acute, nine-sulcate; scales pale chestnut, slightly convex. *l.* 6ft. to 7ft. long; leaflets beset with spines. Sierra Leone. A middle-sized tree.

RAPHIDES, or RHAPHIDES. Crystals formed in the cells of plants, consisting of various salts. They are mostly needle-shaped—hence the name.

RAPHIDOPHORA. A synonym of **Rhaphidophora** (which *see*).

RAPHIOLEPIS. *See* **Rhaphiolepis.**

RAPHISTEMMA (from *raphis*, a needle, and *stemma*, a crown; in allusion to the needle-shaped segments of the corona). ORD. *Asclepiadeæ.* A genus consisting of only two species of stove, twining, glabrous shrubs or sub-shrubs, natives of the East Indies and the Malayan Archipelago. Flowers white, rather large, in umbelliform, long-pedunculate cymes; calyx deeply five-cut or parted; corolla sub-campanulate, with five twisted lobes; corona scales five, adnate at base in a staminal tube. Leaves opposite, membranous. The species introduced requires culture similar to **Stephanotis** (which *see*).

Raphistemma—*continued.*

R. ciliatum (ciliated). A synonym of *Dæmia extensa.*

R. pulchellum (pretty). *fl.*, corolla segments ovate, obtuse, erect; stigma rather prominent, umbilicate. July. *l.* cordate, acuminate, membranous, glabrous on both sides, glanduliferous. East Indies, 1852. Shrub. (F. d. S. 228; L. & P. F. G. 101; P. M. B. xiv. 27.)

RAPUNCULUS. A synonym of **Phyteuma** (which *see*).

RAPUNTIUM. A synonym of **Lobelia** (which *see*).

RASPAILIA. A synonym of *Polypogon.*

RASPALIA (named after F. V. Raspail, a celebrated French chemist and botanist, 1794-1878). ORD. *Bruniaceæ.* A genus comprising seven or eight species of small, greenhouse, Heath-like shrubs, with twiggy branches, confined to South Africa. Flowers white or yellow, small, disposed in small, globose or elongated, not involucrate, densely aggregate heads; calyx five-lobed; petals five, free, not keeled; bracts shorter than the flowers. Leaves dense, imbricated, appressed, thickly coriaceous, glabrous or velvety. *R. microphylla*, the only species calling for description, thrives in a compost of sandy peat. Propagated by cuttings of young, stubby shoots, inserted in sand, under a bell glass, in a cold frame.

R. microphylla (small-leaved). *fl.* white, minute; heads the size of a pea. July. *l.* half to one line long and wide, spirally inserted, the younger ones ciliolate. Branches short, woolly, a little spreading. *h.* 1ft. or more. 1804.

RASPBERRY (*Rubus Idæus*). The Raspberry is a native of most European countries, including Great Britain. It is a deciduous shrub, with a creeping, perennial rootstock, and a biennial stem. The fruit is extensively employed for cooking and preserving in various ways; it is also favoured for dessert, and largely used in the manufacture of Raspberry brandy, wine, vinegar, &c. When first ripened, it has a fine aroma, which is generally not retained longer than a day or two afterwards. Raspberry shoots, which are technically termed "canes," proceed annually from established plants, either from the rootstock or as suckers from the root. They grow through the summer, ripen and lose their leaves in autumn, and bear fruit the following season, on little branchlets, which are produced from the joints (see Fig. 357). In the following autumn, these canes die down, and their place, the next season, is occupied by others that will have been growing in succession. These remarks have reference to the summer-fruiting varieties; those which bear in autumn do so on the points of shoots made during the summer.

PROPAGATION. Raspberries are propagated from seeds, suckers, or offsets, and occasionally from cuttings. Seeds required for sowing should be saved from large, well-ripened fruits. They should be washed, to separate them from the pulp, and afterwards dried a little, yet not too much. If sown at once, in sandy soil, they will vegetate in the spring, be ready for transplanting the following autumn, and bear some fruit the second year. Propagation by suckers or offsets is the plan most generally adopted. These must be carefully detached from established plants, when they proceed from near the base; the root-suckers, which often spring up some distance away, may easily be transplanted. October and November are the best months for making new plantations, and for removing suckers; but the work may be performed, during fine weather, later on in winter. Cuttings are seldom inserted, unless for increasing any particular variety more rapidly than suckers alone admit.

Raspberry—*continued.*

CULTIVATION. Ground intended for a new Raspberry plantation should be well trenched, and have plenty of manure intermixed. A good depth of soil is essential, and a rather moist situation is preferable. When trenching, the subsoil need not be brought to the surface if it is of an inferior description, but it should be moved to a depth of from 2ft. to 2½ft., and have some decomposed manure mixed with it. The usual method of planting is in rows, about 5ft. apart, a distance of not less than 3ft. being allowed between plants in the row. Canes may be arranged singly, in twos, or in threes; when more than one are planted, a space of 6in. should be allowed between them. Two or three canes form a full-sized bush on a stake in a much shorter time than one; but, of course, many more are required, in the first instance, to form a plantation. After the canes are planted, they should be cut down to within 1ft. of the ground; this will encourage the production of stronger growths the next summer than could be expected if they were allowed to fruit the first year. The following autumn, the canes should be tied to stakes, and shortened to a height of about 6ft.; the plantation may then be considered established. In the second season, these canes will bear fruit from the side branchlets, and suckers will proceed from the base, to form others for fruiting the succeeding year; about six of the strongest will be sufficient to leave on each plant; the remainder should be removed early in the season as they appear. The pruning for this and successive seasons consists in cutting away the old canes any time after fruiting, and tying the new ones in the autumn to take their place. Raspberries are sometimes trained to a trellis formed horizontally with strained wire, or narrow strips of wood about 1in. thick, with upright stakes at intervals. The plants for training against these may be arranged about 2ft. asunder, and old and young canes should be trained alternately as far as convenient. Another method of training is that of arching, for which purpose plants may be inserted 4ft. apart, and the tops of one trained over to meet those of that adjoining.

FIG. 357. FRUITING BRANCHLET OF RASPBERRY.

A top-dressing of manure should be applied to Raspberry plantations in the autumn: it may be lightly forked in, but the soil should never be stirred to a great depth; otherwise, many of the surface-roots would be destroyed. When very large fruits are required, but few bearing shoots should be allowed, and these only of the strongest description. The young shoots from a few stools might be kept removed, in order to throw additional support into those fruiting; this, however, would prevent the development of canes for bearing the succeeding year.

Raspberry—*continued.*

FUNGI. Though a good many Fungi grow on dead Raspberry canes, this plant does not experience serious damage from parasitic Fungi. The most common one is a Brand, belonging to *Phragmidium*, a genus of *Uredineæ*, characterised by having the more conspicuous spores (teleutospores) composed of a row of cells, end to end (*see* **Phragmidium**). The leaves of the Raspberry in autumn are often thickly sprinkled with small, black dots, made up of masses of spores of *P. Rubi-Idæi*, Pers. (*P. gracilis*, Grev.), or the Raspberry Brand. The spores are cylindrical, or nearly so, contain from six to ten cells, and end in a conical point. The dark masses are preceded by yellow spots, which are the æcidia, or the uredo form of this plant. These yellow spots are made up of spores, roundish or elliptical in form, yellow in colour, and prickly; but the æcidiospores are produced in rows, while the uredospores grow singly on the tips of short stalks, which are crowded together in separate spots.

The living leaves of Raspberries frequently have the upper side sprinkled thickly with black dots, smaller than those caused by *Phragmidium*. These are the perithecia of *Coleroa chætomium*, Kunze (*Stigmatea Chætomium*, Fries.), one of the *Pyrenomycetes*. With the microscope, it is seen that they lie on the surface of the leaf, and are bristly, globular, and thin. Each contains a number of asci, each of which incloses eight two-celled spores.

Both kinds of Fungi are apt to cause the premature discoloration and the fall of the leaves, but it can scarcely be said that they seriously affect the welfare of the plants. The only remedy is to pick off the speckled leaves, or to cut down and burn those plants that are seriously attacked; but this is seldom, if ever, necessary.

INSECTS. The roots are, in common with those of other plants, liable to be cut and eaten by **Mole Crickets,** and by the usual subterranean larvæ (*e.g.*, **Cockchafers,** &c.). Damage from this cause is so seldom serious that it need not be dwelt on. The young canes, and the fruit, on the contrary, are sometimes very much injured by certain insects. Among these, the following have been recorded in Miss Ormerod's valuable "Reports on Injurious Insects," for 1879 and 1883, as peculiarly destructive. Certain Weevils (*Otiorhynchus picipes*, *O. sulcatus*, &c.) gnaw the young shoots, killing them, and greatly weakening the plants, many of which perish when the attack is severe. Besides this, the beetles gnaw through the bases of the flower shoots, either cutting them off entirely, or biting half through them, causing them to wither, and destroying the crops. For a description of these insects, *see* **Otiorhynchus.** They hide, during the day, under any shelter they can reach, and, as they are wingless, this must be near the plants. Hence, pieces of bark, or similar objects, placed in their haunts, prove good traps, and have been used with success for their capture, since they are easily cleared off the lower surface of such traps. Any sticky substance smeared round the stems would prevent the ascent of the insects to the flower-shoots; but this method is too laborious to be employed for any but choice plants. The most effectual means of destroying the beetles has been found to be shaking the plants after dark over shallow wooden trays, smeared with tar round the sides, to prevent the escape of the insects,

Raspberry—*continued.*

which may then be killed by being thrown into boiling water. In certain districts in the south-west of England, and in France, the Raspberry crop has been injured to the value of hundreds of pounds in a season.

The larvæ of a small moth (*Lampronia rubiella*), the Raspberry-bud Caterpillars, have been found feeding in such numbers in tips of the young shoots, eating their way down the centre, from near the tip towards the base, that the plants were severely injured. These larvæ are bright red, with the head brown. They spin cocoons among dead leaves, in early summer; and, in two or three weeks, from them moths emerge about ½in. in spread of fore wings, which are brown, with gold spots. The larvæ emerge from the eggs in autumn, and feed on the leaves; but in spring they bore into the shoots. They probably hybernate in the soil around the plants; hence, this should be turned over, to expose them to birds, damp, and cold. When the young shoots droop at the tips, the larvæ should be looked for, and, if they are found, the diseased shoots ought to be removed and destroyed, with the larvæ in them.

A second Weevil (*Anthonomus Rubi*) may be called the Raspberry Weevil, inasmuch as it lives in the flower-buds of Raspberries and of Brambles. It is about ⅛in. long by $\frac{1}{2\frac{1}{2}}$in. broad, black, with a fine, grey pubescence, and white scutellum; the wing-cases and the thorax are thickly pitted; the thighs are scarcely toothed. The colour varies so much as to have led to the forms being regarded as species, and named as such. The female bores a hole in each flower-bud, in early summer, and pushes in an egg. She usually gnaws half through the stalk of the bud, and the latter is apt to fall off. The larvæ feed on the parts of the flower-bud, and the beetles appear from the buds in July, and hybernate during winter. When they prove troublesome, they may be shaken off the plants, as recommended for the species of *Otiorhynchus*, and the infested buds may be picked off and destroyed. *See also* the remedies under **Apple-blossom Weevil.**

Another beetle is recorded in the Report for 1883 as "causing fearful havoc, and entirely devouring the Raspberries" in Kent. This is the Raspberry Beetle (*Byturus tomentosus*). The beetle is about ⅛in. long by half as broad. It varies in colour from dull yellow or reddish to brown, and is densely covered with fine grey pubescence; the eyes are black, and the limbs are dull yellow or reddish-yellow. The female bores, like *Anthonomus rubi*, into the flower-buds; and the larvæ live in the fruits, which may ripen. The larvæ have six short legs, are rather flattened, and taper to each end. The head is pale brown; the body yellowish, darker on the back. The larvæ, when mature, leave the fruits, and shelter themselves in crevices, *e.g.*, in cracks of bark of the Raspberry canes, and there form their cocoons, and become pupæ. The beetles emerge in spring. The same remedies may be used against these insects as have been recommended against the other beetles on Raspberries. A very similar insect (*B. unicolor*) is found in the United States of America on Raspberries. The leaves of Raspberries are frequently mined by larvæ of various kinds, which produce in the leaves conspicuous pale winding tunnels. About the most hurtful of these leaf-mining larvæ are those of *Fenusa pumilio*, a small Sawfly, about ⅛in. long, and black, with pale yellow legs, except at the joints, which are black. At times, the damage done by them materially affects the health of the plants. Almost the only remedy is to collect the diseased leaves and burn them, or to crush the larvæ in the leaves between the finger and thumb.

The larvæ of several larger species of Sawflies, and of Moths, feed exposed on the leaves. A Cynipid (*Diastrophus Rubi*) and a Midge (*Lasioptera Rubi*) cause woody galls on the stems, in the form of swellings, sometimes

Raspberry—*continued.*

2in. to 3in. long by ½in. to 1in. thick, tapering upwards and downwards. Three or four kinds of Aphides feed on the leaves and other green parts of the bushes, but none of these are very hurtful. The gall-makers are easily kept in check by cutting off the galls while still young. The larvæ of the moths and Sawflies may be destroyed, if necessary, by applications of hellebore. The Aphides may be treated by any of the methods recommended under the heading **Aphides.**

SORTS. The following list comprises most of the best varieties in cultivation; it is unnecessary to grow all of them, but occasionally one succeeds better than another.

Baumforth's Seedling. Fruit large, dark crimson, of excellent flavour. Considered an improved form of NORTHUMBERLAND FILLBASKET. Good.

Belle de Fontenay. Fruit large, round, red. Leaves silvery underneath. An autumn-bearing variety, which ripens its fruit in October.

Carter's Prolific. Fruit large, deep red; flesh firm, and of good flavour. A very free-bearing summer variety.

Fastolf. Fruit very large, globular, bright red, of good flavour. A most abundant summer bearer; one of the best and most generally useful sorts.

Large-fruited Monthly. Fruit rather large, deep purplish-red, of excellent flavour. A productive autumnal variety.

McLaren's Prolific. Fruit roundish, large, of a deep crimson colour, produced in summer, and again on the young shoots during autumn.

Northumberland Fillbasket. Fruit large, deep red, of good flavour. The variety is a very vigorous-growing one, and an abundant summer bearer.

October Red and **October Yellow.** Varieties with respectively red and yellow fruits, produced from September to November in fine seasons, principally from the young canes.

Prince of Wales. Fruit very large, globular, deep crimson, of excellent flavour. Summer. The canes are light-coloured, and of unusual strength, but are not produced very freely.

Red Antwerp. Fruit large, conical, dull red, of brisk flavour. A very old variety, several forms of which are in cultivation.

Yellow Antwerp. Fruit medium-sized, pale yellow, rich and sweet. An abundant bearer.

RASPBERRY JAM-TREE. A common name for *Acacia acuminata.*

RASPIS. An old name for Raspberry.

RATHEA. A synonym of **Synechanthus** (which *see*).

RATHKEA. A synonym of **Ormocarpum** (which *see*).

RATIBIDA. Included under **Rudbeckia** (which *see*).

RATONIA (from *Raton*, the name used by the Spaniards of St. Domingo, for one of the species). Including *Gelonium.* SYN. *Arytera.* ORD. *Sapindaceæ.* A genus comprising about forty-five species of usually tall trees, all tropical. Flowers small, pedicellate; racemes paniculate, often elongated, slender, many-flowered; calyx small, cup-shaped. Leaves alternate, exstipulate, abruptly pinnate; leaflets alternate or often opposite, entire or rarely serrated. The species are of little horticultural value.

RATS. These animals are far less destructive than mice in gardens and shrubberies, owing to their food being made up to a much less extent of seeds. Their burrows are at times a cause of annoyance in the neighbourhood of ponds or streams, to which they are partial. Their depredations in houses are well known to most persons; but dwelling-houses are more commonly invaded by them than garden-houses, in which food is less often procurable. They feed greedily on eggs, and will eat fledgling birds; hence, they are peculiarly objectionable where it is desired to encourage the smaller birds in pleasure-grounds and gardens. There are, however, instances in which Rats prove themselves very destructive, the worst being, perhaps, when they attack a house of ripe Grapes. The channels in which the hot-water pipes are situate sometimes afford the animals either a means of entry to and exit from the house, or

Rats—*continued.*

else a hiding-place, and it is often difficult to dislodge them before much mischief has been done. They ascend the Vine-rods, and eat off the bunches or berries wholesale, either carrying away or partially devouring them. Sometimes, they enter at night by a front sash, or even from the roof, if the ventilators are left open, and an attack has been once commenced. If Rats are about the garden, the bottom sashes of vineries should always be closed at night, especially after the Grapes are ripe. A plan of prevention, which has been found partially, though not wholly, successful, is tying some brown paper round the rods, 2ft. or so clear above the ground, in the shape of a bell. This prevents the Rats ascending the rods, but, as already stated, their means of ascent are not always confined to these. Rats are also troublesome at times amongst wall fruit-trees outside, by carrying away the fruit when ripening. Poison is the most effective method of destruction, where it can safely be laid down, but the animals often die in places where the stench arising from decomposition proves, for a few days, almost unbearable in the locality.

The Brown or Norway Rat (*Mus decumanus*) is now almost the only kind of true Rat found in Britain, since the Black Rat (*Mus rattus*), formerly very abundant all over the country, has disappeared before the Brown species, probably devoured by the latter. Both are believed to have entered Europe from Asia, and to have spread westward—the Black Rat having come into Europe about the twelfth century of our era, and the other in the sixteenth century. The Brown Rat was first observed in England about 1730. It has spread all over the world by the aid of shipping, and is now very widely naturalised. The Black Rat is distinguished by its fur being greyish-black above, and ashy beneath, and by the tail being a little longer than the body. The Brown Rat is a good deal larger than the Black, and has the fur greyish-brown above, and yellowish-grey beneath; and the tail is a little shorter than the body. It requires to have free access to water, and its habitats are a good deal determined by this need. It is an excellent swimmer, and takes readily to the water.

Another so-called Rat is the Water Rat, or water vole (*Arvicola amphibia*), which is about the size of a small Brown Rat, but is clumsier in form, with a blunt head, short ears, and small eyes; the toes of the hind feet are connected at the base, and the tail is only about half as long as the body. This animal burrows in the banks of streams, and passes most of its time in the water. It is believed to feed almost exclusively on water plants and roots; hence, it is not often hurtful in gardens. The Brown Rats may be destroyed, when necessary, by traps, or by means of the poisons recommended for the destruction of **Mice** (which *see*); or ferrets may be employed to drive them from their holes. When they are very troublesome, the services of a rat-catcher may be resorted to with advantage.

RATTAN CANE. A common name for *Calamus Draco.*

RATTLE, RED. A common name for *Pedicularis sylvatica.*

RATTLE, YELLOW. *See* **Rhinanthus Crista-galli.**

RAUWOLFIA (named in honour of Leonhard Rauwolf, physician at Augsburg, who travelled through Palestine and other Eastern countries in 1753-5). Including *Ophioxylon.* ORD. *Apocynaceæ.* A genus comprising nearly forty species of stove, glabrous or rarely pubescent trees or shrubs, natives of tropical America, Africa, and Asia, and South Africa. Flowers and fruit usually rather small; calyx short, five-fid or five-parted, eglandulose; corolla salver-shaped, with a cylindrical

Rauwolfia—*continued.*

tube, a constricted throat, and five twisted lobes; peduncles alternating with the terminal leaves, few-flowered, or di- or trichotomously branched; cymelets usually umbelliform. Drupes two, distinct or connate in a two-stoned, bisulcate fruit. Leaves in whorls of three or four, or rarely opposite. Some of the species are rather pretty; the best-known are here described. They thrive in a compost of loam, peat, and sand. Cuttings, inserted in sand, under a glass, in heat, will root readily. All are shrubs, except where otherwise stated.

R. densiflora (dense-flowered). *fl.* white, many in a shortly-pedunculate cyme; corolla limb almost equalling the tube. June. *fr.* one-seeded. *l.* lanceolate, acuminate, approximating, sometimes ternate. *h.* 6ft. East Indies, 1824. (B. R. 1273, under name of *Tabernæmontana densiflora.*)

R. majus (larger). *fl.* in terminal cymes; corolla white, smaller than in *R. serpentina.* April. *fr.* violet, resembling an olive in shape. *l.* shortly petiolate, elliptic-oblong, acute, paler beneath, quaternately whorled, entire. *h.* 4ft. Java, 1850. A robust species.

R. nitida (shining). *fl.* in terminal, few-flowered cymes, shorter than the leaves; corolla white. August. *fr.* at first yellow, becoming dark purple, sub-globose, bilobed. *l.* quaternate, ovate-lanceolate, acute at both ends, glabrous and shining, the larger ones 4in. to 5in. long, 1¼in. to 1½in. broad. *h.* 10ft. Spain, 1752. Tree.

R. serpentina (serpentine). *fl.* in sub-umbellate corymbs; corolla white or pink, narrow, nearly ⅔in. long. May. *fr.* red, globose. *l.* 3in. to 6in. long, 1½in. to 2½in. broad, membranous, on petioles ¼in. to ⅔in. long. *h.* scarcely more than 1ft. East Indies, 1690.

R. ternifolia (ternate-leaved). *fl.* in axillary, few-flowered cymes; corolla white. May. *fr.* about the size of a pea. *l.* ternate, oblong, acuminate, acute at base, reticulate-veined, 1½in. to 2in. long, six to eight lines broad, on very short petioles. Branches rarely warted. *h.* 3ft. West Indies, 1823. (B. M. 2440.)

RAUWOLFIA (of Ruiz and Pavon). Included under *Citharexylum.*

RAVENALA (said to be the native name of the plant in Madagascar). SYN. *Urania.* Including *Phenakospermum.* ORD. *Scitamineæ.* A genus comprising a couple of species of noble, stove plants, one of which is a native of North Brazil and Guiana, and the other indigenous in Madagascar. Flowers many in a spathe, large, on very short pedicels, shortly racemose; sepals three, long, narrow, acuminate; petals three, the outer one shorter and slightly complicate, the lateral ones long, similar to the sepals, but smaller; stamens five, slightly shorter than the petals; scapes or peduncles in the upper axils; bracts spathaceous, many, boat-shaped, acuminate, bifariously spreading. Leaves very large, clustered, flabellately bifarious; petioles long and concave at base, scarcely sheathed. Stem sometimes short, with sub-radical leaves, sometimes erect and woody (as high as 30ft.), built up of the sheaths of the leaf-stalks, the other parts of the leaves having fallen off. *R. madagascariensis* is called by the French the Traveller's Tree, probably on account of the water which is stored up in the large, cup-like sheaths of the leafstalks; its seeds are edible. For culture, *see* **Musa.**

P. guianensis (Guiana). *fl.* white; spathes seven, boat-shaped, deflexed, 1ft. to 1½ft. long; scape tall. *l.* distichous, oval-elongated, as long as the petioles. *h.* 15ft. Brazil and Guiana, 1848.

P. madagascariensis (Madagascar). *fl.* white, clustered in alternate, boat-shaped spathes, 7in. long; thyrse axillary, 1½ft. long. *l.* flabellately disposed, long-stalked, sheathed at base, alternate. Caudex tall, arboreous. Madagascar. See Fig. 358, page 280. (F. d. S. 1355; I. H. 1860, 234.) SYN. *Urania speciosa.*

RAVENEA (named in honour of Louis Ravené, a zealous promoter of horticulture at Berlin). ORD. *Palmæ.* A monotypic genus. The species is a slender, stove palm, nearly allied to *Hyophorbe.* For culture, *see* **Areca.**

R. Hildebrandtii (Hildebrandt's).* *fl.* greenish-white, diœcious, on a simply-branched, stalked, fleshy spadix; calyx cup-shaped, three-lobed; petals three, oblong-lanceolate. *l.* long-stalked; leaflets lanceolate, very acute, smooth, light green; rachis cylindrical. *h.* (when mature) 10ft. Comoro Islands, 1878. A graceful, ornamental palm, in habit like some Chamædoreas. (B. M. 6776; I. H. xxvii. 164.)

RAVENIA (no explanation given by author). Including *Lemonia*. ORD. *Rutaceæ*. A genus comprising only a couple of species of highly glabrous, stove or warm greenhouse shrubs, with terete branchlets; one is a native of Cuba, and the other Brazilian. Flowers white or scarlet, few, on axillary, elongated peduncles; sepals unequal, imbricated, the two outer ones larger; corolla tube straight; limb sub-oblique, of five oblong lobes; stamens five, adnate to the throat of the corolla. Leaves opposite, one to three-leafleted; leaflets sub-coriaceous, lanceolate, entire, slightly dotted. The species are beautiful shrubs, thriving in sandy peat and fibry loam. Propagated by cuttings of half-ripened shoots, inserted in sand, under a bell glass, in bottom heat.

R. rosea (rose-coloured). *fl.* rose-red, axillary, 2½in. to 3in. in diameter. Summer. *l.* trifoliolate; leaflets elliptic-obovate, entire, shining. *h.* 2ft. Brazil, 1880.

R. spectabilis (showy). *fl.* deep reddish-scarlet, showy; corolla fleshy, rugulose, hypocrateriform, the segments obtuse; racemes axillary, few-flowered, nearly equalling the leaves. July and August. *l.* trifoliolate; leaflets longer than the pubescent petiole, obovate, obtuse, glabrous. Branchlets pubescent. *h.* 2ft. Cuba, 1839. (B. R. xxvi. 59, under name of *Lemonia spectabilis*.)

RAY. *See* **Radius.**

FIG. 358. RAVENALA MADAGASCARIENSIS (see page 279).

RAY FLOWERS. Those which belong to the margin of a circular flower cluster, and differ from those of the disk, being usually larger.

RAY POD. A common name for *Damasonium stellatum*, the plant described in this work as *Actinocarpus Damasonium*.

REANA. A synonym of *Euchlæna*.

REAUMURIA (named in honour of René A. Ferchault de Réaumur, 1683-1757, a famous French entomologist). ORD. *Tamariscineæ*. A genus comprising about half-a-score species of half-hardy, much-branched, procumbent or divaricate sub-shrubs or small shrubs, natives of the Mediterranean region (mostly Eastern) and central Asia. Flowers terminal, solitary, larger than in *Tamarix*; sepals five, sub-connate or nearly free at base, surrounded by few or many imbricated, sepaloid bracts; claws of the petals broad; stamens many. Leaves small or fleshy, sub-terete, often clustered. *R. hypericoides*, the species best known to gardeners, is a beautiful shrub, of easy culture; a compost of sandy loam and peat is most suitable. It may be readily increased by means of cuttings taken from the young wood, and inserted in similar soil, under a bell glass.

R. hypericoides (St. John's Wort-like).* *fl.* purple; petals irregular, ovate or ovate-oblong, very obtuse, the appendices short and slightly fimbriated at apex; bracts lanceolate-subulate, a little longer than the calyx. August. *l.* coriaceous; cauline ones linear, linear-lanceolate, lanceolate-oblong, or lanceolate. *h.* 2ft. Syria, 1800. (B. M. 2057; B. R. 845.)

REAUMURIACEÆ. Included under *Tamariscineæ*.

RECEPTACLE. "A portion of axis forming a common support or bed on which a cluster of organs is borne. The Receptacle of the flower, or the torus, is the axile portion of a blossom, that which bears sepals, petals, stamens, and pistils. The Receptacle of an inflorescence is the axis or rachis of the head, spike, or other dense cluster" (Asa Gray).

RECHSTEINERA. Included under *Gesnera*.

RECLINATE, RECLINED, RECLINING. Falling or turning backward, so that its upper part rests on the ground or some other object; *e.g.*, the branches of many trees.

RECTISERIAL. Disposed in rectilinear ranks.

RECURVED. Bent, but not rolled, backwards or downwards.

RED BERRY, AUSTRALIAN. *See* **Rhagodia.**

RED BUD. A common name for *Cercis canadensis*.

RED CAMPION. *See* **Lychnis diurna.**

RED CEDAR. *See* **Juniperus virginiana.**

REDHEAD. A common name for *Asclepias curassavica*.

RED-HOT POKER. A common name of *Kniphofia aloides*.

RED LYCHNIS. *See* **Lychnis diurna.**

RED MAGGOT. The name popularly given to small orange or lemon-coloured grubs, which are often to be found in the flowering-heads of grasses, between the glumes. They seem to feed on the juices or sap of the female part, or ovary, of each flower, and thereby prevent the formation of seeds. On cereals, *e.g.*, Wheat, they are often very abundant, and do very great harm to the produce of the crops. The grubs are wrinkled into folds crosswise. They are not provided with feet, but can wriggle along freely; they do not exceed $\frac{1}{12}$in. in length. When full-fed, they become orange pupæ, either in the ear, or on falling to the ground, into which the larvæ burrow before the change. From these pupæ, small, two-winged flies—the Wheat-midges (*Cecidomyia Tritici* and *Lasioptera obfuscata*)—emerge in June and July. The former species is orange or dull yellow, with black eyes, and has the longest vein in each wing unbranched. The latter insect has the body blackish, and the longest vein in the wing is forked. The females lay eggs in the young spikelets of the cereals, by means of a long, flexible tube or ovipositor.

Remedies are required in farming only, as these Midges are hardly ever troublesome in gardens. It has been found very useful to plough so as to bury the surface sods 6in. or 7in. deep; and it is well to sow cereals so as not to ear when the Midges are on the wing. Burning stubble, chaff, &c., has been found of considerable service against them.

RED MOROCCO. A common name for *Adonis autumnalis*.

RED OSIER DOGWOOD. *See* **Cornus stolonifera.**

REDOUTEA. A synonym of **Fugosia** (which *see*).

RED ROOT. *See* **Lachnanthes.** The name is also applied to *Ceanothus americanus*.

RED ROT. A common name for *Drosera rotundifolia*.

RED ROT. A name employed to denote a decayed state of the stem in various Conifers, seldom in other trees, in which the wood becomes decayed and red, and this condition spreads gradually from place to place. The disease is of common occurrence over a great part of Europe. A careful microscopic examination of the diseased wood proves that the cells are full of an abundant mycelium of a Fungus; and Prof. Hartig has shown that the discoloration may be due to more than one Fungus, of which the more important is a species of **Trametes** (which *see*). *Polyporus sulphureus* (*see* **Polyporus**) has been observed to cause a similar condition in Dicotyledonous trees, *e.g.*, Pear-trees, &c.

Treatment. The whole tree, unless valuable, should be cut into firewood and destroyed. If the tree is so valuable as to render its preservation desirable, the diseased portions should be removed and burned, and the conidia ought on no account to be permitted to spread, to the injury of adjacent trees. It is not possible, in the present state of our knowledge, to destroy the mycelium without injuring the wood-cells in which it lies.

RED SPIDER (*Tetranychus telarius*). A small, eight-legged mite, which receives its popular name from its colour (which is almost always between rusty-red and brick-red) and its power, like a spider, of spinning a fine web on the lower surface of the leaves of trees. It is not a true spider. Gardeners are but too well acquainted with its depredations on fruit-trees and hothouse plants, the leaves of which it frequently injures very much. For a full account of Red Spider, and of remedies against it, *see* **Tetranychus telarius.**

REDUPLICATE. Folding and projecting outwards.

RED-WATER-TREE. *See* **Erythrophlœum.**

RED WEED. *See* **Papaver Rhœas.**

RED-WOOD-TREE. A common name for various species of *Ceanothus*, *Pterocarpus*, &c.

REED. *See* **Arundo.**

REED, INDIAN. A common name for *Canna indica*.

REED MACE. *See* **Typha latifolia.**

REEL AND LINE. Garden Lines are indispensable for marking off spaces when cropping, and for indicating the positions of plants, trees, edgings, &c. A long Line should be wound on an iron Reel, as this permits it to dry more readily, after being used in the wet, than it would if rolled up closely on an ordinary stick. A Line Reel is usually made to revolve on a long iron pin by turning a small handle or projection on the upper cross-bar. Various sizes are made, to suit different lengths, of Lines.

REEVESIA (named in compliment to John Reeves, F.L.S., of Canton, a zealous botanist, and the introducer of one of the species). ORD. *Sterculiaceæ*. A genus consisting of two (?) species of greenhouse trees, natives of tropical and sub-tropical Eastern Asia. Flowers white, in terminal, corymbose panicles; calyx clavate-campanulate, irregularly three to five-fid; petals clawed. Leaves entire, coriaceous. *R. thyrsoidea*, the only species introduced, is a very handsome tree, requiring treatment similar to that recommended for the greenhouse species of **Sterculia** (which *see*).

R. thyrsoidea (thyrse-flowered). *fl.*, petals white or cream-coloured, five-clawed; peduncles and pedicels clothed with stellate pubescence. July. *l.* alternate, broadly lanceolate, acuminate, petiolate, entire, penninerved; petioles slender, dilated upwards. *h.* (under cultivation) 3ft. to 4ft. China, 1826. (B. M. 4199; B. R. 1236.)

REFLEXED. Abruptly turned or bent backwards or downwards.

REFRACTED. Similar to Reflexed, but abruptly bent from the base.

REGELIA (named after Dr. E. Regel, Superintendent of the Imperial Botanic Gardens at St. Petersburgh). ORD. *Myrtaceæ*. A genus comprising only three species of rigid, greenhouse shrubs, with the habit of *Beaufortia*, natives of Western Australia. Flowers closely sessile and solitary within each bract, in dense heads, at first terminal, but the central axis soon growing out into a leafy branch; calyx tube ovoid or nearly globular; lobes five, usually deciduous; petals five, spreading; stamens indefinite, united in five bundles opposite the petals. Leaves small, opposite, mostly three or more nerved. *R. ciliata* is the only species yet introduced. For culture, *see* **Beaufortia.**

R. ciliata (fringed).* *fl.* red, in small, dense, globular heads; calyx tube woolly-tomentose or hairy. *l.* erect, spreading or recurved, broadly ovate, obovate, or almost orbicular, obtuse, flat or concave, rigid, prominently three or rarely five-nerved, $\frac{1}{4}$in. to $\frac{1}{2}$in. long. *h.* 3ft. to 5ft. 1874. A spreading, more or less pubescent or hairy shrub. (B. M. 6100.)

REGELIA (of Lemaire). A synonym of **Karatas** (which *see*).

REGELIA. A garden synonym of **Verschaffeltia** (which *see*).

REGULAR. Uniform and symmetrical in shape of structure.

REHMANNIA (named in honour of Joseph Rehmann, a physician of St. Petersburgh, 1779-1831). ORD. *Scrophularineæ*. A genus comprising only a couple of species of hardy, perennial herbs, natives of China and Japan. Flowers rather large, in the axils of the bracts or floral leaves, declinate or pendulous, disposed in terminal racemes; calyx ovoid-campanulate, five-fid at apex; corolla dark purplish or pale, intensely coloured at the throat; limb oblique, sub-bilabiate, with spreading lips. Leaves alternate, obovate or oblong, deeply

Rehmannia—*continued.*

toothed. One of the species has been introduced. It thrives in any ordinary soil, but, though hardy, it will succeed best in a cool greenhouse. Propagation may be effected by cuttings.

R. glutinosa (glutinous). *fl.*, lower ones pedicellate; upper ones sessile; corolla wholly or partially of a dingy purple, 1in. long. April. *l.*, radical ones opposite, but most of them alternate, very shortly stalked, 1in. to 3in. long, acute or obtuse, decreasing upwards. Stem 1ft. to 2ft. high, erect, and, as well as the calyx and under side of the leaves, often purplish. North China, 1835. (B. M. 3653, B. R. 1960, and F. d. S. 1134, under name of *R. chinensis*.)

REICHARDIA (of Dennstaedt). A synonym of **Tabernæmontana** (which *see*).

REICHARDIA (of Roth). A synonym of **Pterolobium** (which *see*).

REICHELIA. A synonym of **Hydrolea** (which *see*).

REIDIA. Included under *Phyllanthus*.

REINECKEA (named in honour of J. Reinecke, a German gardener and successful cultivator of tropical plants). SYNS. *Liriope* (of Salisbury), *Sanseviella*. ORD. *Liliaceæ*. A monotypic genus. The species is a hardy, herbaceous perennial, with a creeping rhizome, thriving in almost any soil. It is readily propagated by division.

R. carnea (flesh-coloured). *fl.* flesh-colour, sweet-smelling, in simple, solitary spikes, under membranous bracts; scape firm, 1in. to 2in. high; bracts deltoid-cuspidate, tinged with red. April. *l.* six to twelve, sub-erect, glabrous, 6in. to 12in. long, ½in. to ¾in. broad. Rhizome broadly creeping. China and Japan, 1792. SYNS. *Sanseviera carnea* (A. B. R. 361), *S. sessiliflora* (B. M. 739).

R. c. variegata (variegated).* *l.* much striped. (I. H. 323.)

REINECKIA. A synonym of **Synechanthus** (which *see*).

REINWARDTIA (of Dumortier) (named after K. G. K. Reinwardt, 1773-1822, director of the Botanic Garden at Leyden). SYN. *Macrolinum*. ORD. *Lineæ*. A small genus (three species) of greenhouse or stove shrubs or sub-shrubs, inhabiting the mountains of the East Indies. Flowers yellow or white, rather large, in very short, fascicle-like racemes, solitary in the axils, or densely corymbose at the tips of the branches; sepals and petals five, the latter fugacious, twisted; stamens connate at base, hypogynous; pedicels bracteate. Leaves alternate, membranous, often serrate, penninerved. *R. tetragynum* and *R. trigynum*, the only species calling for mention here, are old, winter-flowering, warm greenhouse plants, worthy of a more extensive cultivation than they at present receive. Cuttings should be taken from the strongest points of old plants, and inserted, in a close propagating frame, some time during April or May. When rooted, they may be grown on singly, in an intermediate temperature, until established, in 5in. or 6in. pots. Pinching should be frequently practised, when the plants are young, to induce a compact habit. A position in frames, where plenty of air and sun can be admitted, is best in autumn, as it is necessary to thoroughly ripen the recently-made shoots for flowering during the winter. A temperature of about 55deg. will be necessary to open the flowers properly, and keep them from damping-off. Old plants may be cut back, and grown a second year under similar treatment; but they are not generally so strong or satisfactory as new ones annually raised from good cuttings. Red Spider is the most destructive insect to which the plants are subject; frequent and heavy syringings, applied throughout the summer, will keep it in abeyance, and also prove beneficial to the plants.

R. tetragynum (four-styled). *fl.* often 1in. in diameter; styles three or four, united below. *l.* elliptic-lanceolate, acuminate, crenate-serrated. India. Shrub.

R. trigynum (three-styled).* *fl.* yellow, solitary, or a few umbellately clustered; petals obovate, emarginate, the claws connate into a tube. October. *l.* ovate-oblong, entire, aristate-

Reinwardtia—*continued.*

mucronate; stipules minute. *h.* 2ft. to 3ft. 1799. Shrub. (B. M. 1100, under name of *Linum trigynum*.)

REINWARDTIA (of Blume). A synonym of **Saurauja** (which *see*).

REINWARDTIA (of Korthals). Included under **Ternstrœmia** (which *see*).

RELHANIA (named in honour of the Rev. Richard Relhan, who published, in 1785, the "Flora Cantabrigensis"). SYN. *Michauxia* (of Necker). Including *Eclopes*. ORD. *Compositæ*. A genus comprising about eighteen species of greenhouse shrubs or annual herbs, natives of South Africa. Flower-heads yellow, mediocre or rather large and solitary at the tips of the branches, or smaller and solitary at the sides of the branches, or in terminal corymbs; involucre oblong, ovoid, or rather broadly campanulate, with many-seriate bracts; receptacle flat; achenes linear, glabrous or ciliated on the margins. Leaves alternate or rarely opposite, rigid, narrow or small, channelled and concave above, keeled or many-nerved at back. Several species have been introduced, but are probably not now in cultivation. *R. pungens*, the only one which calls for description here, requires culture similar to that recommended for **Athanasia** (which *see*).

R. pungens (prickly). *fl.-heads* yellow, terminal, sessile, solitary, more than 1in. in diameter; ray florets numerous, reddish down the middle of the back. September. *l.* acerose, rigid, sessile, ascending, scattered, rather wide-set, linear-subulate, about ¾in. long, entire, roughened by short, hard, inclined bristles on the outside. Young branches grey-tomentose. 1820. A small, weak, branching shrub. (B. R. 587.)

REMACLEA. A synonym of **Trimezia** (which *see*).

REMUSATIA (named in honour of Abel Remusat, 1785-1832, a celebrated Orientalist and physician). ORD. *Aroideæ* (*Araceæ*). A genus comprising three or four species of stove, tuberous herbs, natives of the mountainous regions of the sub-tropical East Indies and Java. Flowers monœcious, on an inappendiculate spadix, which is shorter than the spathe, sessile, and constricted in the middle; male and female flowers remote; male inflorescence clavate, stipitate, the female narrower and sub-cylindrical; spathe with a convolute, persistent, green tube, a constricted throat, and a yellowish, spreading or refracted, at length split and deciduous lamina; peduncles short. Leaves on long and slender stalks, peltate, ovate-cordate, or lanceolate. Only one species is known to cultivation. It requires culture similar to **Caladium** (which *see*).

R. vivipara (viviparous). *l.* petioled, peltate, cordate, entire, 4in. to 12in. long, and 3in. to 8in. broad, acute, smooth on both sides; posterior lobes obtuse. Scales of the bulbs each ending in a hooked bristle. East Indies. (L. B. C. 281, under name of *Caladium viviparum*.)

RENANTHERA (from *ren*, a kidney, and *anthera*, an anther; alluding to the reniform shape of the anthers or pollen masses). SYN. *Nephranthera*. ORD. *Orchideæ*. A genus comprising about seven species of stove, epiphytal Orchids, natives of tropical Asia and the Malayan Archipelago. Flowers showy or rather small; sepals much spreading, free, petaloid, the lateral ones broader and often longer than the dorsal one, which latter the petals resemble; lip short, sessile at the base of the column, articulated, saccate or spurred; column short and thick; anthers terminal, convex; pollen masses two, ovoid or oblong; peduncles lateral, elongated, branched; racemes loose, ample, panicled. Leaves distichous, spreading, fleshy or rigid, often obliquely bilobed at apex. Stems leafy, branched, not pseudo-bulbous. The best of the species here mentioned are *R. coccinea*, *R. Lowii*, and *R. Storiei*; the first requires warm-house treatment, and should be fastened on a stump of Tree-fern or Ash, against which it will grow to a great length, and flower

Renanthera—*continued.*

freely every summer, if placed in a sunny position and kept moist. *R. Lowii* should be grown in the hottest and moistest house, in a sunny position; but its roots prefer a large pot filled with drainage, sphagnum, and lumps of fibry peat. *R. Storiei* is a rare plant, seldom seen in cultivation, and then always in bad health. It is usually potted in sphagnum and crocks, and placed in a tropical house along with *Phalænopsis*. The other species, not already mentioned, require similar treatment.

R. coccinea (scarlet).* *fl.* of a beautiful blood-red within, disposed in very large panicles; lateral sepals oblong-spathulate, obtuse; dorsal one and petals linear-ligulate; middle lobe of lip bigibbous at base; spur acute, conical, straight. *l.* ligulate, obliquely emarginate at apex. Aerial roots very long. Cochin China, 1816. A splendid plant. (B. M. 2997; B. R. 1131.)

R. elongata (elongated). *fl.* purplish; lateral sepals unguiculate; lateral lobes of lip sometimes sinuate, the middle lobe triangular and very short, bicallous at base; spur obtuse, conical; panicle elongated, nodding. *l.* broadly linear, oblique, emarginate. Kuripan. (B. R. 1843, 41.)

R. histrionica (acting). *fl.*, sepals and petals yellow, bordered with purplish blotches; lip white, with purplish blotches on the side lobes; spur orange; racemes short, few-flowered. *l.* acuminate. Malacca (?), 1878.

R. Lowii (Low's).* *fl.* of two kinds on the same spike, the lowest pair always tawny-yellow enlivened with crimson dots, the remainder pale green, almost hidden on the inner side by large, irregular blotches of reddish-brown; sepals and petals waved, lanceolate, acute, those of the lowest pair more blunt; spikes pendent, 6ft. to 12ft. long, bearing from thirty to fifty flowers. Stems caulescent, 1in. thick, climbing to a great height. Borneo. (B. M. 5475.) The correct name of this plant is now *Arachnanthe Lowei.*

R. matutina (morning). *fl.* at first of a very beautiful blood-colour, paler outside, the disk of the lateral sepals golden, the bases of the petals striped with dark purple; lip very minute, dark purple; panicles much-branched, 2ft. to 3ft. long; peduncles intense purple. *l.* ligulate, obtuse and unequally bilobed at apex; sheaths sometimes violet.

R. m. breviflora (short-flowered). A distinct variety, differing from the type in its shorter sepals, the lateral ones more free from one another, and the calli under the column larger. Sunda Isles, 1879.

R. moluccanum (Moluccan). *fl.* red, dotted; sepals all linear-ligulate; lateral lobes of lip bilobulate; middle lobule not callous at base; peduncles long-exserted at the apex of the panicle. *l.* shortened, oblong, obtusely bilobed at apex. Amboyna, 1846.

R. Storiei (Storie's). *fl.* more than 2in. across; dorsal sepals and petals dark orange; lower sepals broad, of a brilliant velvety-crimson, with lighter shades of the same colour; lip small, deep crimson, with small yellow bars, centre white. Philippines, 1880.

RENEALMIA (named in honour of Paul Renealme, a French botanist, who published, in 1611, a "History of Plants"). SYNS. *Ethanium, Gethyra, Peperidium.* ORD. *Scitamineæ.* A genus comprising about fourteen species of stove, herbaceous perennials, natives of tropical America, one being also found in tropical Western Africa. Flowers one to three or many, beneath membranous, but not imbricating, bracts; calyx cup-like or loosely tubular, shortly trilobed; corolla tube short or rarely longer than the calyx, the lobes erect, or at length spreading, subequal, or with the dorsal one broader; raceme or thyrse sometimes on a leafless, scaly scape from the rhizome, sometimes at the tip of a terminal, leafy stem. Leaves two-ranked. The only species known to cultivation requires culture similar to **Alpinia** (which *see*).

R. exaltata (exalted). *fl.* scarlet, on one- to three-flowered pedicels; scape coloured, villous; raceme elongated; bracts lanceolate, as long as the flowers. July. *fr.* blackish-violet, oval, 1in. long, with aromatic seeds. *l.* sessile, lanceolate, glabrous. *h.* 2ft. (sometimes, in a wild state, 8ft. to 10ft. or more). West Indies, 1820. (B. M. 2494 and B. R. 7771, under name of *Alpinia tubulata.*)

RENEALMIA (of Linnæus). A synonym of **Tillandsia** (which *see*).

RENEALMIA (of Houttuyn). A synonym of **Villarsia** (which *see*).

RENEALMIA (of Robert Brown). A synonym of **Libertia** (which *see*).

RENIFORM. Kidney-shaped. A Reniform leaf with crenated margin is shown at Fig. 359.

FIG. 359. RENIFORM LEAF, WITH CRENATED MARGIN.

RENSELAERIA. A synonym of **Peltandra** (which *see*).

REPAND. Applied to a leaf which has its margins slightly uneven.

REPENS, REPENT. Creeping; lying flat upon the ground, and emitting roots at the same time.

REPLICATE. Folded backwards.

REPLUM. The frame left in certain fruits by the falling away of the valves in the act of dehiscence.

REPTANT. The same as **Repens** (which *see*).

REQUIENIA. Included under **Tephrosia** (which *see*).

RESEDA (the old Latin name used by Pliny, from *resedo*, to calm or appease; the application of the plants to external bruises was considered useful by the Latins). Mignonette. ORD. *Resedaceæ.* A genus of annual or biennial, hardy, erect or decumbent, glabrous or pilose herbs. About twenty-six may lay claim to specific rank; these are mostly natives of South Europe and North Africa, and are also found in Syria, Persia, and Arabia. Flowers racemose, bracteate; calyx four to seven-parted; petals hypogynous, four to seven, unequal, two to many-fid; torus sub-sessile. Capsule indehiscent, three-lobed at apex. Leaves entire, lobed or pinnatisect; stipules gland-formed. *R. lutea* and *R. Luteola* (Dyers' Rocket, Dyers' Weed, or Dyers' Yellow Weed) are natives of Britain. The latter plant was formerly in great demand for dyeing purposes. Few of the species are of any great value to horticulturists. *R. odorata*, the common Mignonette, is one of our most highly-valued and sweet-scented garden plants. For culture, enumeration of varieties, &c., *see* **Mignonette.**

R. alba (white). *fl.* with white petals and brownish anthers, disposed in dense spikes; calyx five or six-parted. May to September. *l.* all pinnatifid or sometimes interruptedly pinnate; segments lanceolate, smooth, rarely waved. *h.* 2ft. South Europe, 1596. Hardy biennial. (S. F. G. 459.)

R. frutescens (shrubby). A form of *R. odorata.*

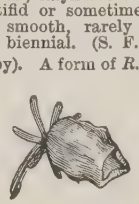


FIG. 360. CAPSULE OF RESEDA ODORATA.

R. odorata (fragrant).* Common Mignonette. *fl.* with yellowish-white petals and saffron anthers, disposed in loose racemes; calyx six-parted, equalling the petals, which are finely cleft into many club-shaped divisions. June to October. *l.* lanceolate, bluntish, entire or trifid. North Africa, Egypt, &c., 1752. Plant diffuse. See Fig. 360. (B. M. 29.) The variety *frutescens* is merely a shrubby form of this species. (B. R. 227.)

RESEDACEÆ. A small natural order of annual or perennial herbs, rarely shrubs, mostly found in South Europe, North Africa, Syria, Asia Minor, and Persia; a few reach the Indian frontier, and three inhabit the Cape Colony. Flowers hermaphrodite or rarely unisexual, racemose or spicate, one-bracted; calyx persistent, four to seven-parted, unequal or almost equal, the segments imbricated; petals four to seven, rarely two (or none), deciduous or persistent, hypogynous or perigynous, entire or three or many-fid, ample, or with a membranous

Resedaceæ—*continued.*

appendix at the base, free or rarely sub-coherent, open in æstivation; disk hypogynous, sessile or stipitate, often dilated behind; stamens three to forty, perigynous or inserted within the disk, not covered by the petals in æstivation; filaments free or monadelphous at base; anthers two-celled, introrse. Fruit a capsule, closed or gaping at the apex, rarely a berry, sometimes follicular; seeds many, rarely few. Leaves scattered or fascicled, simple, trifid, or pinnatiparted; stipules small, gland-like. Mignonette (*Reseda odorata*), one of the members of this order, requires no eulogy here. The Dyers' Weed (*R. Luteola*) yields a yellow dye, which is largely used; its leaves are very bitter. The order comprises half-a-dozen genera, and, according to the authors of the "Genera Plantarum," not more than thirty distinct species. *Reseda* is the principal genus.

RESIN, ANIME. *See* **Hymenæa Courbaril.**

RESIN PLANT. A common name for *Bursera acuminata* and *B. gummifera*, *Dammara australis*, *Guaiacum officinale*, *Pistacia Lentiscus*, &c.

REST-HARROW. *See* **Ononis.**

RESTIACEÆ. A natural order of usually perennial herbs, tufted or with horizontal or creeping rhizomes; they are mostly natives of South-west Africa or Australia, a few are found in New Zealand, one in Chili, and one in Cochin China. Flowers dicœcious, rarely monœcious, very rarely hermaphrodite, in spikelets; perianth regular; segments six, rarely reduced to five, four, or three, glumaceous, rigid, scarious, or hyaline, more or less distinctly biseriate; stamens in male flowers three, filaments filiform; ovary of females one to three-celled; inflorescence variable. Fruit dry, often small, nut-like or capsular, terete, compressed, or triquetrous. Leaves sometimes few, radical, long, cyperoid, frequently nearly all reduced to sheaths. Stems rigid, simple or branched, erect, flexuous, or variously twisted. The order comprises twenty genera, and about 230 species, few of which are of any horticultural value. Examples: *Restio*, *Willdenowia*.

RESTING. Plants are said to be Resting during any period when growth in them is inactive. The term is only applicable to such as live over one year: nearly all of these require a Resting season after completing their annual growth.

RESTIO (from *restis*, cord; alluding to the use of the plants in South Africa). Rope Grass. SYNS. *Craspedolepis*, *Ischyrolepis*, *Megalotheca*, *Rhodocoma*. The principal genus of ORD. *Restiaceæ*. It consists of about 100 species, none of which are of any special interest; several have been introduced to this country.

RESTREPIA (named in honour of Joseph E. Restrep, a naturalist who travelled in South America). ORD. *Orchideæ*. A genus of stove Orchids, with tufted stems, or having simple, creeping branches. About a score species have been described, natives of tropical America, from Brazil as far as Mexico. The genus is very closely related to *Pleurothallis*, but is distinguished by having four pollen masses; the habit is very similar, but the peduncles appear to be constantly one-flowered, and the flowers are often, but not always, larger. The undermentioned species are those best known to gardeners. For culture, *see* **Pleurothallis.**

R. antennifera (antennæ-bearing). *fl.* yellow, dotted with red or purple; lip linear, retuse, scabrous, trinerved, bearing tendrils close to the base. *l.* ovate, acute, shorter than the stems, occasionally rich purple on the under side; sheaths falcate, sometimes speckled with purple. Venezuela, &c., 1869. (B. M. 6288.) SYN. *R. maculata.*

R. Dayana (Day's). *fl.*, upper sepals and petals violet-brown, filiform, clavate; lower sepals connate into a broad, bifid piece, which is yellowish and brown; lip yellow, mottled with purple, ligulate. *l.* stout, roundish-acute, nearly heart-shaped at the base. Costa Rica, 1875. "A lovely little gem," of tufted growth.

Restrepia—*continued.*

R. elegans (elegant). *fl.* chiefly yellow, spotted with purple, much smaller than those of *R. antennifera*; lip linear, retuse, hollowed out and dilated at base, with a tooth on each side. *l.* oval, twice the length of the stems; sheaths straight. Caraccas, 1872. (B. M. 5966; F. d. S. 743.)

R. Falkenbergii (Falkenberg's). *fl.* yellow, with some white and purple marks. *l.* large, bluish-purple beneath; sheaths one-coloured, without blotches. New Grenada, 1880.

R. Lansbergii (Lansberg's). *fl.*, upper sepals and petals crimson; front sepals white, with crimson dots; lip yellow, with purple blotches, unctuous, linear, truncate, scabrous, excavated and broader at the base. *l.* oval, equalling the stems; sheaths straight, closely imbricated. Venezuela, Guatemala, &c., 1861. This resembles small specimens of *R. antennifera*. (R. X. O. i., p. 170, t. 60.)

R. maculata (spotted). A synonym of *R. antennifera.*

R. prorepens (forward-creeping). *fl.* yellow, solitary, on a long, capillary peduncle, and nodding, bending the two straight, linear sepals forward, and having both widely clasping, the inferior connate, boat-shaped, much narrower towards the top; lip very small, scarcely equalling the column, pandurate, sub-acute, with a small angle before each base, and a lamella in each middle side. *l.* very small, narrow, fleshy, emarginate at apex, with a small apiculus between. Rhizomes creeping, in large masses. Costa Rica, 1877. (R. X. O. iv. 11-17.)

R. Reichenbachiana (Reichenbach's). *fl.* canary-yellow, on filiform peduncles, nearly 4in. long and cruciform, the tips of the inferior, connate sepals dark purple; these and the petals having also a dark purple line at the base, and the upper sepal two such lines. *l.* spathulate-oblong, obovate, minutely tridentate at the apex, about 2in. high. Costa Rica, 1875. Habit densely tufted. (R. X. O. ii. 5-10.)

R. xanthophthalma (yellowed-eyed). "A pretty species, with yellow-purple-blotched flowers." Guatemala and Venezuela. (B. M. 5257, under name of *R. Lansbergii.*)

RESUPINATE. Inverted in position; appearing as if upside down.

RESURRECTION PLANT. A common name for *Anastatica Hierochuntina*, *Mesembryanthemum Tripolium*, and *Selaginella lepidophylla.*

RETAMILIA. A synonym of **Retanilla** (which *see*).

RETANILLA (the Peruvian name of the genus). SYN. *Retamilia.* ORD. *Rhamneæ.* A small genus (two or three species) of almost leafless, unarmed, branched shrubs and sub-shrubs, natives of Chili and Peru. Flowers on short, sub-racemose or fasciculate branches, opposite, shortly pedicellate; calyx urceolate or campanulate; petals and stamens four or five. Drupes rather large, globose. Leaves very caducous, opposite, entire. The species are probably lost to cultivation in this country.

RETICULATED. Netted; in the form of network.

RETINARIA. A synonym of **Gouania** (which *see*).

RETINIA. A genus of small moths, belonging to the group of *Tortricidæ*, of some importance because of the damage inflicted by them on Scotch Firs and other *Coniferæ*. Several species occur in Great Britain, and the larvæ of all, so far as known, feed in the buds or young shoots of the *Coniferæ*. The moths vary from ¼in. to nearly 1in. in spread of wing; the front wings are nearly three times as long as broad, with the tip rather rounded, and the front and hind borders slightly rounded; the hind wings are rather broad and pointed. The species of chief importance practically are the following, which may be distinguished in the adult state by the characters mentioned below:

1. Fore wings grey, with rusty-yellow tip of wing and head.

(*a*) Thorax dark brown; fore wings grey-brown, with paler cross-lines, and decidedly rusty-yellow tip; spread of wings, six and a half to seven lines	*duplana.*
(*b*) Thorax rusty-yellow in front; fore wings wider behind, spreading nine to ten lines, pale grey patch at tip, duller ochreous than in *R. duplana*; hind wings pale at base	*turionana.*

Retinia—*continued.*

2. Fore wings with brown-grey or black markings.

(*a*) Fore wings pale grey, with numerous dark markings, and a basal patch bordered by a rather sharply-angled line; spread of wings, eight and a half to ten and a half lines ..... } *occultana.*

(*b*) Fore wings dark blackish-grey, with numerous irregular, silvery cross-streaks, most distinct along the hind margin, and white spots along the front margin; spread of wings, nine to eleven lines ..... } *resinana.*

3. Fore wings bright reddish-orange.

(*a*) Fore wings paler along inner, and near front, margins, with several indistinct, silvery cross-lines beyond the middle of wing; spread of wings, ten to eleven lines..... } *Buoliana.*

(*b*) Fore wings with basal patch well defined, and bordered by a yellow, silvery cross-line; beyond the middle are several very distinct, yellowish-silvery, irregular cross-streaks; spread of wings, nine to ten lines .. } *pinicolana.*

These species are almost all considerably more common in Scotland than in England, though most of them may be met with wherever the food-plants grow. All reach the perfect stage some time between June and August. The females lay their eggs on the young buds and twigs. The larvæ hatched from these eggs gnaw their way into the buds and leading shoots, and bore into the pith, there to remain usually all winter, since they are still feeding in the following spring. They are of the usual form of the larvæ of *Tortricidæ*, with rather cylindrical, naked bodies and dark, horny heads and shields on segments just behind the heads. They have six true legs and ten prolegs, or claspers.

Almost any one of the species would deserve the name of Pine-bud Moth; but the name has been given to the species *R. turionana*.

The result of an attack on Firs by these larvæ is that the leading shoots may be hollowed out, even in the bud state, or they become bent, brown, and brittle; and the trees become distorted, because of the loss of these shoots, and the ill-development of the shoots that have taken their place in the course of growth. In general, there is a considerable outflow of resin from the wounds made by the larvæ; and this resin hardens on the surface and forms a protection during winter to the larvæ. *R. turionana* is hurtful especially to the buds. *R. Buoliana* and the others are more dangerous to the newly-formed shoots. *R. resinana* is called the Resin-gall Moth, because of the fact that the larva produces a false gall of resin, by exudation of resin over the place where it is boring into the wood. It is not unlike a half walnut in form, and may even reach nearly or quite to this size; but it is dirty-white in colour, and remains soft while it is occupied. The larvæ are said to pass two winters before they become pupæ, which they do in spring, and the moths emerge in June.

Remedies. Owing to the larvæ living entirely under cover, no external applications are of the least use: the only method found at all successful has been the removal and burning of all shoots that show signs of attack by any of the species of *Retinia*.

RETINIPHYLLUM (from *retine*, resin, and *phyllon*, a leaf; the leaves are covered with resin). SYN. *Commianthus.* ORD. *Rubiaceæ.* A genus consisting of half-a-dozen species of glabrous, pubescent or pilose, stove shrubs, natives of North Brazil and Guiana. Flowers white, flesh-colour, or pink, in terminal, simple spikes; calyx limb tubular, truncate, entire, or five-fid; corolla hypocrateriform, with five narrow, reflexed lobes; stamens five. Berries small, five-stoned, edible. Leaves opposite, petiolate, coriaceous, obovate or oblong, often abruptly

Retiniphyllum—*continued.*

acuminate, with numerous diverging nerves. For culture of the only species introduced, *see* **Hamiltonia.**

R. secundiflorum (side-flowering). *fl.* white, in clusters of from two to four; spikes axillary, pedunculate, side-flowered. July. *l.* obovate, obtuse or emarginate at apex, cuneate at base, coriaceous, pubescent beneath. *h.* 4ft.

RETINOSPORA. Included under **Chamæcyparis** (which *see*).

RETROFLEXED. The same as **Reflexed** (which *see*).

RETRORSE. Directed backwards or downwards.

RETROVERTED. Inverted.

RETUSE. Terminating in a round end, the centre of which is depressed.

RETZIA (named in honour of Anders Johan Retzius, 1742-1821, Professor of Natural History in the University of Lund). ORD. *Solanaceæ.* A monotypic genus. The species is a greenhouse, evergreen, erect shrub, with straight, densely-leafy branches. It will thrive in any light soil. Propagation may be readily effected by cuttings, inserted in sand, under a bell glass.

R. capensis (Cape). *fl.* red or orange, two or three at the nodes or in the axils, long, but almost concealed by the leaves; calyx semi-five-fid; corolla with an elongated tube, and five, rarely six or seven, short, induplicate-valvate lobes. May. *l.* whorled, long-linear, coriaceous, entire or with revolute margins, silky-pilose when young (and in the axils). *h.* 4ft. South Africa.

REVOLUTE. Rolled backwards from the margins or apex; *e.g.*, certain tendrils, and the sides and ends of some leaves.

RHABDOCRINUM. A synonym of **Lloydia** (which *see*).

RHACHIS. *See* **Rachis.**

RHACOMA (of Adanson). A synonym of **Leuzea** (which *see*).

RHACOMA (of Linnæus). A synonym of **Myginda** (which *see*).

RHADINOCARPUS. A synonym of *Chætocalyx.*

RHAGODIA (from *rhax*, *rhagos*, a berry; in reference to the characteristic fruit). Australian Red Berry or Sea Berry. ORD. *Chenopodiaceæ.* A genus comprising thirteen species of slender or robust, mealy or slightly tomentose, greenhouse shrubs, rarely herbs, confined to Australia. Flowers greenish, small or minute, clustered or rarely solitary, disposed in interrupted, terminal spikes or panicles. Fruit a small berry. Leaves alternate and sub-opposite, sessile or petiolate, linear, ovate, oblong, or cordate, entire or sinuately lobed. Five species have been introduced, but it is doubtful whether any remain in cultivation.

RHAMNEÆ. A natural order of erect or climbing, often prickly, very rarely tendrilled or glandulose trees, shrubs, or very rarely herbs, inhabiting warm and tropical regions. Flowers green or yellowish, hermaphrodite, rarely polygamous, dicœcious, small, usually disposed in axillary, loose or dense-flowered, sometimes unilateral cymes; calyx tube obconical, turbinate, urceolate, or cylindrical, the limb of four or five erect or recurved lobes; petals four or five, inserted at the throat of the calyx, emarginate or lobed, sessile or clawed, or absent; stamens four or five, opposite to, and inserted with, the petals; filaments subulate or filiform, rarely dilated; anthers versatile, sometimes ovoid, with longitudinal dehiscence, sometimes reniform and one-celled by confluence of the cells at the top, and opening into two valves by an arched slit; disk perigynous, rarely absent. Fruit capsular or drupaceous, three, rarely one to four-celled. Leaves simple, stipulate, rarely exstipulate, opposite or nearly so, often coriaceous, entire or serrated (in *Colletieæ* often absent); stipules small, usually deciduous,

Rhamneæ—*continued.*

sometimes changed to thorns. The most useful genera, from an economic point of view, are *Rhamnus* and *Zizyphus*, the species of which yield medicinal juices, &c. *Rhamnus davuricus* and *R. tinctorius* yield the famous Green Indigo, the Lo-Kao of China. The order comprises thirty-seven genera, and about 430 species. Examples: *Hovenia*, *Paliurus*, *Pomaderris*, and *Rhamnus*.

RHAMNUS (from *Rhamnos*, the old Greek name used by Theophrastus). Buckthorn. Including *Frangula*. ORD. *Rhamneæ*. A genus embracing about sixty species of stove, greenhouse, or hardy shrubs or trees, inhabiting temperate and tropical regions. Flowers axillary, racemose or cymose; calyx four or five-cleft, the tube urceolate, the lobes keeled within; petals four or five, cucullate or flat, or wanting; stamens four or five; filaments very short. Drupe berry-like, oblong or spherical, two or four-stoned. Leaves alternate, rarely sub-opposite, petiolate, deciduous or evergreen, penninerved, entire or toothed; stipules small, deciduous. Several of the species afford useful products, especially dyes, and the fruits of many possess violent purgative properties. Few of the plants are valuable from a garden standpoint. The hardy kinds grow in any ordinary soil, and may be propagated by layers, or by seeds. The stove and greenhouse species are easily grown in any light soil, and may be multiplied by cuttings, inserted in sand, under a glass (the stove kinds in heat). Except where otherwise stated, the under-mentioned species are hardy, deciduous shrubs.

R. Alaternus (Alaternus). *fl.* green, dicœcious, disposed in short racemes; petals wanting. April to June. *l.* ovate-elliptic or lanceolate, coriaceous, quite smooth, serrated. *h.* 20ft. Mediterranean region, 1629. There are several varieties of this species, the best being one with foliage broadly margined with silvery-white: this is known under the name of *R. A. variegata*.

R. alpinus (alpine). *fl.* greenish, dicœcious, four-parted; female ones with four-cleft stigmas. May and June. *fr.* black. *l.* oval-lanceolate, crenate-serrated, smooth, lined with many parallel nerves. *h.* 4ft. Europe, &c., 1752. (L. B. C. 1077.)

R. californicus (Californian). *fl.* greenish, pentandrous; panicles on short peduncles. May. *l.* coriaceous, about 2in. long, elliptic-oblong, entire, revolute on the margins, glabrous; young ones pubescent. *h.* 6ft. to 12ft. North America, 1874. An unarmed evergreen shrub. SYN. *R. oleifolius* (H. F. B. A. i. 44).

FIG. 361. FLOWERING AND FRUITING TWIGS OF RHAMNUS CATHARTICUS.

R. catharticus (cathartic). *fl.* green, ¼in. in diameter, four-parted, solitary and fascicled in the axils of the fascicles of leaves on the previous year's wood. May to July. *fr.* black, ¼in. in diameter. *l.* ovate, acutely-serrated, 1in. to 2in. long, fascicled at the ends of the shoots, sub-opposite lower down, shortly petiolate, the young ones downy beneath. *h.* 5ft. to 10ft. Europe (Britain), &c. See Fig. 361. (F. D. v. 850; Sy. En. B. 318.)

R. croceus (yellow). *fl.* greenish, in axillary clusters, pentandrous; petals wanting. May. *fr.* greenish or yellowish. *l.* coriaceous, roundish-obovate, about ½in. long, lucid; when dry, of a bright yellowish-brown beneath. *h.* 4ft. California, 1848. A much-branched, thorny, evergreen shrub. (J. H. S. vi., p. 217.)

R. davuricus (Dahurian). *fl.* greenish-yellow, four-parted, numerous, fascicled in the axils. May. *l.* glabrous, fascicled at the ends of the exceedingly congested branchlets, ⅜in. to 2½in. long, obovate, acuminate, to narrow elliptic-lanceolate. Spines terminating the divaricating branches. *h.* 15ft. to 20ft. China, Eastern Siberia, &c., 1817. Tree or shrub. SYN. *R. utilis*.

Rhamnus—*continued.*

R. d. hirsutus (hairy). *l.* 2in. long. A large shrub or small tree.

R. Frangula (Frangula). Berry-bearing Alder. *fl.* greenish-white, five-parted, few, axillary. May and June. *fr.* black, ¼in. in diameter, globose. *l.* obovate, quite entire, alternate; stipules

FIG. 362. FLOWERING AND FRUITING TWIGS OF RHAMNUS FRANGULA.

subulate. Branches slender, unarmed. *h.* 5ft. to 10ft. Europe (Britain), &c. The wood, called Black Dogwood, is used by gunpowder-makers. See Fig. 362. (Sy. En. B. 319.)

R. latifolius (broad-leaved). *fl.* greenish, hermaphrodite; calyx villous, four-parted; stigma slightly three-cleft. July. *l.* elliptic, acuminate, quite entire, lined with twelve or fifteen lateral nerves; younger ones villous. *h.* 5ft. Azores, 1778. (B. M. 2663; W. D. B. i. 11.)

R. libanoticus (Lebanon). *fl.* yellowish, fasciculate. May. *l.* clustered at the tips of the branchlets, slightly tomentose, shortly petiolate, ovate or oblong, obtuse, rounded at base, margin finely denticulate. Branches clothed with whitish bark. *h.* 6ft. Asia Minor and Syria, 1879. Plant unarmed. The foliage turns a dull bronzy-purple in autumn. (B. M. 6721.)

R. macrophyllus (large-leaved). *fr.* black. *l.* 5in. to 6in. long 2½in. to 3in. broad, coriaceous, dark green and shining above, pale and strongly veined beneath; petioles purplish. China (?), 1876.

R. oleifolius (Olive-leaved). A synonym of *R. californicus*.

R. robustus (strong). *fl.* green, small. May. *fr.* black, globose, ¼in. in diameter. *l.* broadly ovate-lanceolate, convex, 7in. to 8in. long, 3in. to 3½in. broad, coriaceous, dark green. *h.* 18ft. 1879. A very vigorous tree.

R. utilis (useful). A synonym of *R. davuricus*.

RHAPHIDOPHORA (from *rhaphidos*, a needle, and *phero*, to bear; alluding to the needle-like hairs which abound in the intercellular spaces in all parts of the plants). SYN. *Raphidophora*. ORD. *Aroideæ* (*Araceæ*). A genus comprising about thirty species of slender or robust, climbing, stove shrubs, with very long, rooting branches, natives of tropical Asia, the Malayan Archipelago, Australia, and the Pacific Islands, with a few African. Flowers dense, on a sessile, inappendiculate, usually hermaphrodite, thick, cylindrical spadix; spathe thick, boat-shaped, including the spadix, at first oblong and convolute, afterwards opening, often rostrate, marcescent, at length deciduous; peduncles terminal, solitary or many. Leaves distichous, unequilateral, often large, lanceolate or ovate-oblong, entire, perforated, or pinnatifid, rarely pinnatipartite; segments broad at base; petiole short or elongated, long-sheathed. The species described below are those best known to gardeners. A compost of rich loam and fibrous peat, in equal parts, is admirably suited for their culture. The plants should be placed in the border, near a wall or a dead stem of a tree, so that their climbing propensities may be encouraged. A moist atmosphere is essential to success. Propagation may be effected by seeds; or by cuttings, inserted in sandy loam and peat, under a hand glass, with bottom heat.

R. decursiva (decurrent). *fl.*, spathe yellowish, pale on the margins, very thick, longer than the petiole; spadix greyish-green, long and thick. *l.* oblong, unequally pinnatisect as far as the midrib; segments, on adult leaves, fifteen or more on each side, sub-equal, linear; petioles one-third shorter than the leaves. India, &c., 1859.

Rhaphidophora—*continued.*

R. lancifolia (lance-leaved). *fl.*, spathe apricot-coloured and green-spotted outside, salmon-colour within, 3in. to 4in. long, 2½in. to 3in. wide, ovate, acuminate, open; spadix white, cylindrical, erect, obtuse. *l.* lanceolate, cuspidate, 9in. to 10in. long, unequal-sided, dark shining green, glabrous. Stem cylindrical. Khasia and Sylhet, 1874. (G. C. 1874, ii. 612.)

P. Peepla (Peepla). *fl.*, spathe yellowish outside, reddish-yellow within, ovate-acuminate, shorter than the petiole; spadix yellowish. *l.* oblong or elliptic-oblong, rounded at base, or cuneate, with a long cuspidate-acuminate apex, acute. East Indies.

R. pertusa (perforated). *fl.*, spathe scarcely equalling the petiole, but exceeding the spadix. *l.* unequilateral, loosely cordate at base, shortly cuspidate at apex, entire, pertuse, or pinnatifid; petioles about a quarter shorter than the leaves. East Indies.

RHAPHIOLEPIS (from *rhaphis*, a needle, and *lepis*, a scale; alluding to the narrow, subulate bracts). Erroneously spelt *Raphiolepis*. Indian Hawthorn. ORD. *Rosaceæ*. A genus comprising about five species of interesting, hardy or half-hardy, evergreen shrubs or trees, natives of China and Japan, one being also found in the Sandwich Isles (?). Flowers white or red; calyx with an obconical or funnel-shaped tube and five deciduous, subulate lobes; petals five, clawed, oblong, acute; stamens many; inflorescence paniculate or corymbose; bracts subulate, deciduous. Berries pulpy. Leaves alternate, petiolate, coriaceous, entire or serrulate. The most suitable compost for these shrubs and trees is one of loam, peat, and sand. Ripened cuttings will readily root in sand, under a hand glass. Some of the species will stand our winters outside, if planted against a south wall, and covered with mats during severe weather. Those best known in gardens are described below.

R. indica (Indian). East Indian Hawthorn. *fl.* white or pink-tinted, the size of those of the Hawthorn, in short, terminal panicles. February to August. *l.* ovate or lanceolate. *h.* 4ft. China, 1806. Half-hardy shrub.

R. i. phæostemon (brown-stamened). *fl.*, petals white; filaments brown. *l.* lanceolate, acuminated at both ends. 1820. (B. R. 468, under name of *R. indica*.)

R. i. rubra (reddish). *fl.* reddish; petals lanceolate. *l.* ovate-lanceolate, acuminated at both ends. 1806. (B. R. 1400 and L. C. B. 3, under name of *R. rubra*.)

R. i. salicifolia (Willow-leaved). *fl.* white. *l.* long-lanceolate. 1821. (B. R. 652, under name of *R. salicifolia*.)

R. japonica integerrima (entire-leaved Japanese). *fl.* snow-white, odorous, ¾in. in diameter; panicles terminal, erect, 2in. to 4in. high, densely clothed below with large, ciliated bracts. June. *l.* alternate and obscurely whorled, 2in. to 3in. long, broadly obovate, obtusely apiculate, dark green and shining above, paler below. Branches stout. Japan, 1865. Hardy shrub. (B. M. 5510.)

RHAPHITHAMNUS (from *rhapis*, a needle, and *thamnos*, a shrub; on account of the spiny character of some of the species). SYN. *Pœppigia* (of Bertero). ORD. *Verbenaceæ*. A small genus (six species) of unarmed or spiny shrubs or trees, all natives of Chili. Flowers nodding, at the axils of minute bracts; calyx tubular-campanulate, shortly five-toothed; corolla tube straight, enlarged above, the limb spreading, of four or five unequal lobes; stamens four, didynamous; racemes axillary, few (often one or two) flowered. Leaves opposite, rather small, ovate, entire. Only two species have been introduced. For culture, *see* **Myrtus.**

R. cyanocarpus (blue-fruited). *fl.* pale blue, solitary or in pairs, shortly stalked; corolla tubular, ½in. long. Summer. *l.* broadly ovate and acute or orbicular and mucronate, very coriaceous, bright deep green above, pale beneath. *h.* 15ft. to 20ft. A densely leafy greenhouse tree, hardy in the Channel Islands and South-west England. (B. M. 6849.)

RHAPIDOPHYLLUM (from *Rhapis*, and *phyllon*, a leaf; in reference to its resemblance to the genus *Rhapis*, both producing suckers freely—a character by no means common in the Palm family). ORD. *Palmæ*. A monotypic genus. The species is a low, greenhouse palm, with a short, erect or creeping trunk. For culture, *see* **Chamærops.**

Rhapidophyllum—*continued.*

R. Hystrix (porcupine). Blue Palmetto. *fl.* yellow, minute; spathes about four, oblong, woolly, acutely two-lipped; spadix small, short-peduncled. June and July. *fr.* a small drupe. *l.* 3ft. to 4ft. high, circular in outline, deeply and unequally plicate, and cut into numerous two to four-toothed divisions, silvery beneath, on triangular, rough-edged petioles; sheaths persistent, composed of oblique fibres interwoven with numerous strong, erect spines. Trunk 3ft. to 4ft. long. Southern United States, 1801. SYN. *Chamærops Hystrix* (I. H. 1883, 486).

RHAPIS (from *rhapis*, a needle; alluding to the needle-like segments of the leaves). ORD. *Palmæ*. A genus comprising four or five species of low, Chinese and Japanese, greenhouse Palms, with long, densely-tufted, reed-like, leafy caudices. Flowers yellowish; spathes two or three, incomplete, membranous; spadices shorter than the leaves, borne on slender peduncles, the branches spreading. Fruit consisting of one to three small, obovoid, one-seeded carpels. Leaves alternate and terminal, sub-membranous, connate or semi-orbicular, deeply cut into three to many segments, which are linear, cuneate, or elliptic, truncate, entire, toothed, or cut, three to many-nerved; petioles slender, biconvex, with smooth or serrulated margins; sheaths split into a fibrous network. Several of the species have been introduced, for culture of which *see* **Chamærops.**

R. aspera (rough). A synonym of *R. flabelliformis*.

R. cochinchinensis (Cochin China). *fl.*, spadix short, branched. *fr.* ovate, not edible. *l.* fan-shaped, palmately divided; segments oblong, obtuse, much plaited; petioles short, straight, prickly. Caudex 8ft. high. Cochin China.

FIG. 363. RHAPIS FLABELLIFORMIS.

R. flabelliformis (fan-leaved).* Ground Rattan Cane. *fl.*, males yellowish, sessile, thickly covering the spikelets; spadix sparse, paniculate-branched, 4in. to 5in. long. *l.* petioled, five to seven-

Rhapis—*continued.*

parted; segments sub-plicate, ciliate-spinulose along the edges and keel of the plaits, indented-erose at the end; petioles round-ancipital, naked, very obscurely denticulate. Stem about 1½ft. high, as thick as the thumb, sheathed by the reticulated, persistent bases of the leaves. China and Japan, 1774. See Fig. 363. (B. M. 1374.) SYN. *R. aspera.*

R. f. foliis-variegatis (variegated-leaved). A form in which the leaf-segments are more or less freely striped with white. Japan, 1861.

R. humilis (low-growing). *l.* cut into from seven to ten spreading segments; petioles unarmed. Similar in general aspect to *R. flabelliformis.* Japan. SYN. *R. Sirotsik* (of gardens).

R. Sirotsik (Sirotsik). A garden synonym of *R. humilis.*

RHAPONTICUM (from *Rha*, the old Greek name for Rhubarb, and *Ponticus*, of Pontus. It was also called *Rheum barbarum. See* **Rheum**). ORD. *Compositæ.* A genus comprising about half-a-dozen species of annual or perennial herbs, of which the best known is described below. *Rhaponticum* is included, by Bentham and Hooker, under **Centaurea** (which *see* for culture).

R. scariosum (scarious). *fl.-heads* purple; outer involucral scales all scarious, sub-entire or at length cut; inner ones narrower and very acuminate. July. *l.* glabrous above, cano-tomentose beneath; lower ones petiolate, ovate or cordate, denticulate; middle ones shortly petiolate, ovate-oblong; uppermost ones sessile, oblong, acuminate at both ends, scarcely toothed. *h.* 2½ft. Switzerland, &c., 1640. (B. M. 1752, under name of *Centaurea Rhapontica.*)

RHATANY ROOT. The root of **Krameria triandra** (which *see*).

RHEA. A common name for *Bœhmeria nivea.*

RHEEDIA (called after Hen. van Rheede, 1635-1691, a Dutchman residing at Malabar, author of "Hortus Malabaricus"). ORD. *Guttiferæ.* A genus embracing nineteen species of stove trees, inhabiting Madagascar and tropical Africa and America. Flowers usually rather small; sepals two; petals four; peduncles axillary or lateral, one-flowered. Leaves rigidly coriaceous, slenderly penniveined. The species are of little or no horticultural interest.

RHEUM (from *rheon*, an adjective formed from *Rha*, the old Greek name for Rhubarb. *Rheon barbarum* has been corrupted into our Rhubarb). Rhubarb. ORD. *Polygoneæ.* About a score species have been referred to this genus, but the number may be reduced; they are hardy, robust, perennial herbs, with thick and slightly woody rhizomes, natives of Siberian, Himalayan, and Eastern Asia. Flowers pedicellate, fasciculate, ebracteolate, the fascicles disposed in narrow, paniculate racemes; perianth of six spreading segments. Leaves large, sinuate-toothed or palmately lobed, three to eight-nerved at base. *R. Rhaponticum* and its varieties, and *R. undulatum*, furnish the rhubarb so well-known and extensively employed. Several of the species are very handsome, both in their foliage and in their inflorescence. The rhubarb of commerce, an important medicine, valuable for its mild purgative properties, is afforded by several species of *Rheum*, of which the following are the principal: 1. *R. palmatum*, first found wild in 1872-3, by Colonel Prejavalsky, in the Tangut district of Kansu, the extreme north-western province of China; this is the real source of the Russian, or Turkey, Rhubarb. 2. *R. officinale*, from the Chinese frontier of Eastern Thibet. 3. *R. Rhaponticum*, generally called English Rhubarb, a native of Southern Siberia, known to have been cultivated, early in the seventeenth century, at Padua, whence it was brought to England, the first plant being raised about the year 1628. It is largely cultivated at Bodicott for medicinal purposes. A selection of the best-known species is given below. Any of them are well worthy of cultivation as hardy, fine-foliaged plants, for wild gardens, margins of shrubberies, &c. They succeed in almost any soil, but do best where it is rich, and of a good depth. Propagated by seeds, and by division. For culture of the well-known garden varieties, *see* **Rhubarb.**

Rheum—*continued.*

R. acuminatum (taper-pointed). *fl.* lurid-purple, bloody, or brownish-purple, ¼in. in diameter, spreading; panicle slightly branched. *l.* broadly cordate, with a deep sinus, long-acuminate, opaque above, puberulous below; petioles slender, concave above. Root slender, often many feet long. *h.* 3ft. Sikkim, 1837. (B. M 4877.)

R. australe (Southern). *fl.* in a long, racemiform, dense panicle; calyx purple. *l.* sub-orbicular, broadly cordate, obtuse, flat, 3in. to 4in. long, nearly 3in. broad; petioles 4in. long, slender, slightly terete, angulate-sulcate. Stem 6ft. to 10ft. high, leafy. Root fusiform, branched. Nepaul. (S. B. F. G. 269.)

R. Emodi (Emodus). *fl.* whitish, in a fastigiate, dense panicle. *l.* broad-ovate, obtuse, cordate, with slightly wavy margins, five to seven-nerved; petioles semi-terete. Stem tall, leafy. *h.* 6ft. to 10ft. Himalaya.

R. nobile (noble).* *fl.* green, insignificant, in short, branched panicles; bracts delicate straw-colour, shining, semi-transparent, concave, imbricating, concealing the flowers, the upper ones with pink edges. *l.*, radical ones large, bright glossy green, with red petioles and nerves; stipules pink, fragile. *h.* upwards of 3ft. Roots thick, fleshy, sometimes many feet long. Sikkim. A lovely species. (G. C. n. s., iii. 91.)

R. officinale (officinal).* *fl.* greenish, small, collected into dense spikes. *l.* large, somewhat orbicular-reniform, five-nerved, and cut into five short lobes at the margin; lobes unequally incised. Stem 8ft. to 10ft. high, leafy and much-branched. Thibet, 1871. A stately plant. (B. M. 6135; B. M. Pl. 213; R. H. 1874, 13.)

R. palmatum (palmate-leaved). *fl.* in a leafy panicle. *l.* sub-orbicular-cordate, palmately lobed, slightly scabrous or glabrous above, three to five-nerved; lobes ovate-oblong or lanceolate, acute, undivided, or incised-toothed or pinnatifid; petioles nearly cylindric. *h.* 5ft. East and North Asia, 1763. (B. M. Pl. 214.)

R. Rhaponticum (*Rha ponticum—i.e.*, Pontic Rha or Rheum, the name of the drug Rhubarb in the Latin medical writers—applied to the present species by the old botanists). Common cultivated Rhubarb. *fl.* densely disposed in a leafy, fastigiate panicle. *l.* sub-orbicular, profoundly cordate, undulated, five-nerved, glabrous above, puberulous below and on the veins; upper ones ovate or acuminate; footstalks long, thick, and fleshy, channelled above, and rounded at the edges. *h.* 4ft. 1573. (B. M. Pl. 215.)

FIG. 364. RHEUM UNDULATUM.

R. undulatum (undulated). *fl.* densely disposed in a fastigiate panicle, which is leafy below. *l.* ovate-cordate, undulated, five to seven-nerved, glabrous above, puberulous beneath; uppermost ones sub-sessile, two or three times longer than broad; petioles semi-terete, loosely channelled above, with rounded margins. Stem 4ft. to 5ft. high, smooth, green. Siberia, &c., 1734. See Fig. 364.

RHEUMATISM ROOT. A common name for *Jeffersonia diphylla.*

RHEXIA (from *rhexis*, a rupture; applied to this genus for no obvious reason). ORD. *Melastomaceæ.* A genus comprising about seven species of mostly hardy, pretty, erect herbs or sub-shrubs, natives of extra-tropical Eastern North America. Flowers variously coloured, solitary or cymose; calyx tube oblong, campanulate, or urceolate, the dilated limb of four triangular or subulate lobes; petals four, obovate; stamens eight. Leaves oblong, shortly petiolate, three-nerved, entire or bristly-serrulate. The species described below are all hardy herbs. They thrive best in a bed of peat, but are sometimes grown in pots of the same soil. Propagation may be readily effected by division. Some of the plants formerly placed under this genus are now included under **Pleroma** (which *see*).

R. ciliosa (hair-fringed).* *fl.* purple, 1in. to 1½in. in diameter; cyme few-flowered, leafy. July and August. *l.* rarely as much as 1in. long, ovate, bristly on the upper surface, three-ribbed. Stem simple, 1ft. to 1½ft. high, smooth, four-angled above. 1812. (S. B. F. G. 298.)

R. mariana (Maryland). *fl.* purple, 1½in. to 2in. wide, hairy externally; calyx mostly smooth. July to September. *l.* lanceolate, acute, short-petioled, bristly-serrate, three-ribbed. Stem 1ft. to 2ft. high, branched, terete or six-angled. 1759. Plant bristly. This species varies with narrower, often linear leaves, and smaller, whitish flowers. (L. B. C. 366; S. B. F. G. 41.)

R. virginica (Virginian).* Deer Grass; Meadow Beauty. *fl.* bright purple, cymose. July and August. *l.* ovate and ovate-lanceolate, barely acute, sessile, bristly-serrate, three to five-ribbed, the lowest rounded. Stem 6in. to 12in. high, four-angled, nearly simple. 1759. Plant bristly. (B. M. 968; Gn. ii. 294, 69; L. B. C. 840.)

RHINACANTHUS (from *rhis*, *rhinos*, the nose, and *Acanthus*; alluding to the curious shape of the Acanthus-like corolla). ORD. *Acanthaceæ.* A small genus (about four species) of stove, loosely branched, sometimes sub-scandent shrubs, natives of tropical and South Africa, Madagascar, the East Indies, and the Malayan Archipelago. Flowers few, at the axils of the bracts, sub-sessile, sometimes fascicled or cymose and paniculate; calyx deeply five-cut, with narrow segments; corolla with an elongated tube and a bilabiate limb, the dorsal lip bidentate, the anterior one trifid; stamens two, affixed to the throat of the corolla. Leaves entire. The best-known species is described below. For culture, *see* **Justicia.**

R. communis (common). Ringworm Root. *fl.* white; upper lip linear, straight; panicle axillary or terminal, bi- or trichotomously spreading. June. *l.* oblong or ovate-oblong. *h.* 2ft. East Indies, 1790. (B. M. 325, under name of *Justicia nasuta.*)

RHINANTHACEÆ. Included under *Scrophularineæ.*

RHINANTHUS (from *rhis*, *rhinos*, the nose, and *anthos*, a flower; alluding to the form of the corolla). Yellow Rattle. SYN. *Alectorolophus.* ORD. *Scrophularineæ.* A genus comprising two or three very variable, erect, hardy annuals, natives of Europe, temperate and North Asia, and North America. Flowers sessile in the axils of the floral leaves, ebracteolate, upper ones spicate; calyx four-toothed; corolla yellow, violet, or blue, often spotted, with a bilabiate limb, the upper lip entire, the lower one of three spreading lobes. Leaves opposite; cauline ones crenate; floral ones often incised-toothed, with the teeth setaceo-cuspidate. The species are more or less parasitic on the roots of grasses, and thrive in any moist situation: they may be propagated by seeds.

R. Crista-galli (Cock's-spur). Penny-grass; Yellow Rattle, &c. *fl.*, corolla yellow, the upper lip blue. May to July. *l.* distant, 1in. to 2in. long, oblong-lanceolate or linear-oblong, obtuse or acute, deeply crenate-serrate. Stem 6in. to 18in. high, erect, simple or branched. Europe (Britain). (Sy. En. B. 998, under name of *R. minor.*)

R. major (greater). *fl.* orange-yellow; corolla tube longer than the glabrous calyx segments; lobes of the upper lip longer than broad; lower lip shorter than the upper. Late summer and autumn. *l.* opposite, sessile, deeply serrated. Stem usually copiously paniculate-branched. *h.* 6in. to 18in. Europe (Britain). (Sy. En. B. 999.)

RHINE-BERRY. A common name for *Rhamnus catharticus.*

RHINOPETALUM. Included under *Fritillaria.*

RHIPIDODENDRON. Included under *Aloe.*

RHIPIDOPTERIS. Included under **Acrostichum** (which *see*).

RHIPOGONUM (from *rhips*, a rod, and *gonu*, a knee or joint; in allusion to the jointed stalk). Sometimes spelt *Ripogonum.* ORD. *Liliaceæ.* A small genus (five species) of tall, climbing, greenhouse shrubs, of which one is a native of New Zealand, and the rest are Australian. Flowers rather small, shortly pedicellate or sub-sessile, racemose or spicate; perianth segments distinct, equal, or the outer ones shorter. Leaves often mostly opposite, sometimes all alternate, three to five-nerved, with reticulated veinlets; petioles not cirrhiferous. The species are little known in cultivation. *R. album* requires culture similar to **Myrsiphyllum** (which *see*).

R. album (white). *fl.* white, rather distant, in axillary, simple racemes, usually shorter than the leaves. June and July. *fr.* red when fresh, drying black, ¼in. in diameter. *l.* irregularly opposite or alternate, elliptic or oblong, varying to ovate or almost lanceolate, shortly acuminate, narrowed at base, mostly 3in. to 4in. long. Main branches often prickly. Australia, 1820.

RHIPSALIS (from *rhips*, a Willow-branch; referring to the flexibility of the branches). Including *Lepismium* and *Pfeiffera.* ORD. *Cacteæ.* A genus of greenhouse, succulent shrubs, with sub-radicant, elongated, terete, or leafy-dilated and crenate stems. Thirty species have been described, natives of tropical America, one being found in South Africa, and one in Mauritius and Ceylon. Flowers lateral, rarely terminal; calyx tube not produced above the ovary, with three to many very

FIG. 365. FLOWERING BRANCH OF RHIPSALIS FUNALIS.

short, scale-like lobes; petals six to ten, spreading, ob long; stamens numerous. Berry sub-globose, smooth. Leaves scale-like. The species best known in gardens are described below. They should be grown in a compost of sandy loam, leaf mould, and brick rubbish. Propagation may be effected by cuttings, inserted in rough

Rhipsalis—*continued.*

gravel or brick rubbish, after having been dried at the base for a few days.

R. brachiata (forked). A synonym of *R. Saglionis.*

R. Cassytha (Cassytha).* *fl.* abundant on the sides of the branchlets, often crowded; calyx teeth five or six; petals five or six, greenish-white; stamens twelve to fourteen. September. *fr.*, berry waxy-white, like that of the Mistletoe. Stems slender, terete, firm, branched, in dense whorls, the branches again branched; joints rare, except at the branching. *h.* 1ft. Tropics, &c., 1758. (B. M. 3080.)

R. communis (common). *fl.* rose, white; crenæ furnished with an ovate acute scale and numerous white hairs. Summer to December. Plant articulated, erect, sub-radicant, pale green, triangular; ribs much compressed, repandly crenated. Brazil, 1836. (B. M. 3763, under name of *Lepismium commune.*)

R. crispata (curled). *fl.* white, minute, scarcely odorous; petals six, ovate, reflexed; stamens numerous. December. *fr.*, berry white, globose. Plant sub-erect, articulated; branches orbicular or oblong, sub-petiolate, yellowish-green, almost membranous, deeply crenate, the margins slightly curled. *h.* 1ft. Native place unknown.

R. fasciculata (cluster-branched). *fl.* similar to those of *R. Cassytha*, but smaller; petals five, dirty-yellow. *fr.*, berry white, crowned with the remains of the corolla. Plant creeping, branched; branches fascicled, green, terete, very sparsely setose; young ones spirally sub-angular; areolæ slightly clustered. Brazil. (B. M. 3079.)

R. funalis (cord-like). *fl.* white, very copious, ten lines in diameter, inodorous; petals seven or eight; stamens very numerous; February to April. Trunk 2ft. to 3ft. high, at length woody; branches long, terete, obtuse; areolæ scattered, almost naked. Central America. See Fig. 365 SYN. *R. grandiflora* (B. M. 2740).

R. grandiflora (large-flowered). A synonym of *R. funalis.*

R. Houlletii (Houllet's).* *fl.* straw-colour, copiously produced in the axils of the marginal teeth. Branches pendulous; the articulations 3in. to 6in. long, elliptic-lanceolate, coarsely toothed, and of a glabrous-green, with a faint tinge of brownish-purple along the margins. Brazil, 1874. (B. M. 6089.)

R. mesembryanthemoides (Mesembryanthemum-like). *fl.* white, ¼in. across at the lateral joints; petals five, much-spreading. Spring. *fr.*, berry white. Plant glomerately branched; branches 8in. to 10in. long, sub-erect, terete, bearing rooting joints; lateral joints clustered, terete, attenuated at both ends; fascicles of spines pale white, dying off blackish. Tropical America, 1817. (B. M. 3078.)

R. pachyptera (thick-winged). *fl.* numerous upon the joints, solitary in each crenature; calyx leaflets three, brownish; petals five, pale yellowish-green. November. Plant 1ft. to 2ft. high, proliferously jointed and branched; joints 4in. to 6in. long, oblong, remarkably compressed, 1in. to 3in. broad, the margins slightly thickened, crenate-lobed, glabrous; lateral thickened nerves leading off from the distinct midrib, curving upwards to the crenatures. Brazil. (B. M. 2820, under name of *Cactus alatus.*)

R. paradoxa (paradoxical). *fl.* yellow, white; crenæ remote, furnished with white hairs, and propped by leafy bracts. August to November. Plant diffusely sub-erect, sub-articulated; joints elongated, slender, three or four-sided; margins acute, crenulated, purple. Brazil, 1837. (B. M. 3755, under name of *Lepismium Myosurus.*)

R. penduliflora (pendulous-flowered). This is closely allied to *R. Saglionis*; it differs in its pendulous habit, fastigiate and quite terete branches, and pendulous flowers with more obtuse petals. Tropical America, 1877.

R. pentaptera (five-winged). *fl.* white, ½in. across, very copious in the crenatures of the branches and on the upper part of the trunk; petals six or seven, biseriate. February and March. Plant sub-erect, 1½ft. high, long-jointed, full green; main stem five or six-angled, with slender, slightly twisted, five-angled branches; areolæ remote. Brazil.

R. rhombea (diamond-branched). *fl.* greenish-white, solitary, small. Stem terete or variously compressed, and, as well as the branches, sub-erect, articulated, diffuse; joints 1in. to 3in. long, with filiform wings, ovate- or lanceolate-rhomboid, highly glabrous, and shining, incised-crenate at the margins. Brazil. (Ref. B. 152.)

R. Saglionis (Saglio's). *fl.* greenish-yellow, rather large, terminal upon divaricate articulations, on the lower part of the stem. *h.* 8in. to 10in. Plant erect or nearly so; main stem cylindrical, bearing the few scattered flowering branches below, and above many horizontal branches, which are again divided, always opposite, brachiate, and with more numerous and shorter joints as they come nearer the ultimate divisions. Buenos Ayres. SYN. *R. brachiata* (B. M. 4039).

R. salicornoides (Glasswort-like).* *fl.* yellow, terminal, solitary or in pairs; corolla superior; petals numerous, thin, concave, never opening wide. Spring. Plant trailing (young specimens erect), proliferous; branches very numerous, spreading, jointed; joints club-shaped, rounded, tubercled, smooth, scarred, glaucous; older stems grey. Brazil. (B. M. 2461; G. C. n. s., v. 731.)

Rhipsalis—*continued.*

R. sarmentacea (twiggy-stemmed). *fl.* white. Stem slender, creeping, rooting, slightly branched, obtuse-angled; areolæ clustered, minute, prickly, slightly tomentose; prickles eight to twelve, very slender, bristly, unequal, snow-white. Bonaria, 1858. (B. M. 5136.)

R. Swartziana (Swartz's). *fl.* whitish, minute. June. *fr.*, berry nearly black. Stem 1ft. to 2ft. high, simply branched, winged above; summit resembling the branches. Branches 6in. to 12in. long, alternate, flat, oblong or oblong-linear, remotely crenate, tapering at the stipitate, jointed base. Jamaica, 1810.

RHIZANTHOUS. Flowering from the root, or apparently so.

RHIZOBIINÆ. A group of Aphides, which derive their name (meaning "root-livers") from living underground upon roots of various plants. In this group all the species exhibit this habit; but so also do various genera outside the *Rhizobiinæ*, strictly so-called, *e.g.*, most species of *Paracletus*, *Schizoneura*, and *Trama*, and a few species of the genera *Aphis*, *Phylloxera*, *Pemphigus*, and *Siphonophora*. In all the above genera there are species more or less hurtful to garden plants, by feeding on their roots, and thereby weakening them; and several of the species have been referred to the genus *Rhizobius* because of their mode of life—*e.g.*, *Trama radices*, described by Westwood, under the name *Rhizobius Helianthemi*. A very large part of the root-feeding Aphides select roots of grasses; but they also feed largely on Lettuces (*Pemphigus*), Jerusalem Artichokes, French Beans, and Scarlet Runners (*Tychea Phaseoli*, &c.). A curious circumstance connected with these insects is the relation that exists between them and certain species of ants, in whose nests they usually remain; in the nests they are carefully attended to by the ants. In the genus *Rhizobius* no winged forms are known, nor do honey-tubes exist. Owing to their mode of life, it is difficult to free plants when once attacked by these subterranean Aphides. Probably, the best means is to water them with a solution of gas-water or gas-lime, or of carbolic acid; or to make use of carbon disulphide, poured into holes in the soil near the roots.

RHIZOBOLEÆ. Included under *Ternströmiaceæ.*

RHIZOBOLUS. A synonym of *Caryocar.*

RHIZOCARPOUS. Literally, root-fruited; having a perennial root, but a stem which perishes annually.

RHIZOGLOSSUM. Included under *Ophioglossum.*

RHIZOID. Resembling a root.

RHIZOME. "A rootstock; a stem of root-like appearance, prostrate on or under ground, from which rootlets are sent off; the apex progressively sending up herbaceous stems or flowering stalks, and often leaves" (Asa Gray).

RHIZOMORPHOUS. Having the appearance of a root.

RHIZOPHORA (from *rhiza*, a root, and *phoreo*, to bear; the branches emit roots freely, and these descend into the mud in which the tree grows). Mangrove. ORD. *Rhizophoreæ.* A genus comprising two (or four or five) species of stove trees, inhabiting tropical shores and mud swamps. Flowers rather large, sessile or pedicellate, on axillary, bi- or trichotomously branched peduncles. Leaves opposite, petiolate, thickly coriaceous, ovate or elliptic, entire, glabrous. "In the economy of Nature, the Mangrove performs a most important part, wresting annually fresh portions of the land from the dominion of the ocean, and adding them to the domain of man. This is effected in a twofold manner: by the progressive advance of their roots, and by the aërial germination of their seeds, which do not quit their lofty cradle till they have assumed the form of actual trees, and drop into the water with their roots ready prepared

Rhizophora—*continued.*

to take possession of the mud, in advance of their parent stems" (Dr. Wm. Hamilton, in the "Pharmaceutical Journal"). *R. Mangle* has been introduced to this country, but is difficult to cultivate.

RHIZOPHOREÆ. A natural order of usually quite glabrous trees and shrubs, with terete branchlets swollen at the nodes, almost wholly tropical, and to a great extent littoral. Flowers usually hermaphrodite, axillary, disposed in cymes, panicles, spikes, or racemes, rarely densely clustered or solitary, small or rather large, bibracteolate or ebracteolate; calyx tube more or less adnate to the ovary, rarely free; limb three to fourteen-lobed or entire, persistent; petals as many as the calyx lobes, usually small, concave or involute, and embracing the stamens, notched, bifid, or lacerate, rarely entire, convolute or inflexed in bud; stamens twice, or three or four times, as many as the petals, rarely equal in number; ovary usually inferior, two to five (rarely six) celled. Fruit usually coriaceous, crowned with the calyx limb, indehiscent or rarely septicidal, one-celled and one-seeded, or with two to five one-seeded cells. Leaves opposite and stipulate, rarely alternate and exstipulate, petioled, thickly coriaceous, usually quite entire, in a few cases sinuate-crenulate or serrulated; stipules interpetiolar, very caducous. The wood of *Rhizophora Mangle* is described as edible, and when fermented produces a light wine. The order comprises seventeen genera, and about fifty species, none of which are of horticultural value. Examples: *Haplopetalum, Rhizophora.*

RHIZOS. This term, used in Greek compounds, signifies a root; *e.g., Rhizophora.*

RHODAMNIA (from *rhodamnus*, a small branch; in reference to the size of the plants). SYN. *Monoxora.* ORD. *Myrtaceæ.* A genus of stove or greenhouse shrubs or small trees. Twelve species have been enumerated; of these, three are natives of Eastern or tropical Australia, and the rest of tropical Asia. Flowers often small; calyx tube ovoid or sub-globose; limb of four persistent lobes or segments; petals four, spreading; pedicels short, sometimes very short, fasciculate in the axils, or shortly and loosely racemose; bracteoles small, caducous. Leaves opposite, ovate or lanceolate, three-nerved or triplinerved, often hoary or downy beneath. The only species introduced is often erroneously classed under *Eugenia.* For culture, *see* **Myrtus.**

R. trinervia (three-nerved). *fl.* white; peduncles slender, axillary, three together in a cluster, or on a short, common peduncle, each with one or rarely three flowers. May. *l.* ovate-oblong or ovate-lanceolate, acuminate, glabrous and much reticulated above, prominently three-nerved from the base, beneath, as well as on the young shoots and inflorescence, velvety-pubescent. Australia, 1823. A tall greenhouse shrub or small tree. (B. M. 3223, under name of *Eugenia trinervia.*)

RHODANTHE. Included under **Helipterum** (which *see*).

RHODIOLA. Included under **Sedum** (which *see*).

RHODITES. A genus of Gall-flies (*Cynipidæ*), all the known species of which, viz., six European and four American, make galls on Roses, but on no other plants, with the exception of *R. radicum*, one of the American forms, which is said also to gall the roots of Raspberries, and of Blackberries or Brambles.

R. Rosæ produces the well-known Bedeguar Gall on various kinds of Roses; *R. spinosissimæ* makes galls of very varied form on twigs, leaves, and fruits of *Rosa spinosissima* and *R. canina*; *R. Eglanteriæ* makes smooth, round galls, like small peas, on leaves of *Rosa canina* and *R. rubiginosa*; *R. centifoliæ* makes similar galls on *Rosa centifolia*; *R. rosarum* causes the growth of small, round leaf-galls, each decked with a few long prickles, on various kinds of Roses; and *R. Mayri* forms galls on leaves and branches of *Rosa canina.* All the

Rhodites—*continued.*

above are natives of Europe. For further information, *see* **Rose-galls.**

RHODO. This term, used in Greek compounds, signifies red; *e.g., Rhodochiton, Rhodostachys.*

RHODOCHITON (from *rhodo*, red, and *chiton*, a cloak; in reference to the large, coloured calyx). ORD. *Scrophularineæ.* A monotypic genus. The species is an elegant, greenhouse herb, with the petioles and peduncles usually twisted and climbing. For culture, *see* **Maurandya.**

R. volubile (twining).* *fl.* on axillary, elongated pedicels; calyx pale reddish, ample, broadly campanulate, semi-five-fid; corolla dark blood-colour, rather large, with five erecto-patent lobes. June. *l.* alternate, cordate, acuminate, with a few acute teeth, sparsely glandular-puberulous. *h.* 10ft. Mexico, 1833. (B. M. 3367; B. R. 1755; S. B. F. G. ser. ii. 250.)

RHODOCISTUS BERTHELOTIANUS. A synonym of **Cistus candidissimus** (which *see*).

RHODOCOMA. A synonym of **Restio** (which *see*).

RHODODENDRON (an old Greek name, from *rhodos*, a rose, and *dendron*, a tree; in allusion to the rose-red flowers of many of the species). Rose Bay. *Azalea* and *Rhodora* are merged, by the authors of the "Genera Plantarum," into this genus, but for garden purposes they have been kept distinct in this work. ORD. *Ericaceæ.* A large and popular genus of highly ornamental, glabrous, pubescent, tomentose, or lepidoted, stove, greenhouse, or hardy shrubs, rarely trees. The species, which number upwards of 100, are natives of the mountains of Europe, Asia, the Malayan Archipelago, and North America, often gregarious, being copiously found on the Himalayan mountains. Flowers usually large, often disposed in terminal, many or few-flowered, sometimes subracemose corymbs, rarely axillary or solitary; calyx variable, five-sepaled, five-toothed, patelliform, cup-shaped, or obsolete, coriaceous or leaf-like, persistent; corolla variable, often funnel-shaped or bell-shaped, rarely tubular, salver-shaped, or sub-rotate; limb more or less oblique, five (rarely six to ten) lobed or rarely parted, very rarely sub-bilabiate, the lobes imbricated; stamens eight to ten, rarely five or twelve to eighteen, more or less unequal, sometimes spreading; filaments subulate-filiform or short and thick, usually pilose or bearded at the base. Capsules short or elongated, woody, five to twenty-celled. Leaves alternate, often clustered at the tips of the branchlets, entire, coriaceous, rarely membranous, annual or biennial.

Rhododendrons may justly be classed amongst the most beautiful and attractive of evergreen, flowering shrubs. Their foliage is at all times attractive, and the flower-trusses, which vary much in size with the species or variety, are usually borne in the greatest profusion whenever the plants succeed. Amongst outdoor shrubs, none are more showy when in flower than the gorgeous varieties and hybrids raised from *R. ponticum.* This species itself has now been so generally superseded by varieties or hybrids, that it need no longer be grown extensively, except for covert planting, and for the supply of stocks whereon to graft the superior forms. Some of the grandest indoor plants, where space can be allowed them to develop, are specimens of the Himalayan species, many of which have flowers highly perfumed, in addition to their other good qualities. Of late years, numerous hybrids have been raised, by using, for crossing and inter-crossing, several of the species and hybrids which have been from time to time obtained. These are all beautiful, and well adapted for culture in small pots, for greenhouse decoration. They have always been much valued, and seem deservedly to be fast increasing in popularity.

Propagation. There are several methods by one or more of which the species, hybrids, and varieties of

Rhododendron—*continued.*

Rhododendron may be increased—namely, seeds, cuttings, and layers, and by grafting. Budding and inarching are also practicable. The seeds, which are very minute, require to be sown in thoroughly-drained pots, or shallow pans, of sandy peat. The top layer should have a little more sand intermixed than is necessary for the other portion, and should be passed through a fine sieve. After the surface has been rendered smooth and pressed firm, the pots, or pans, should be watered previous to sowing, and then allowed to drain. Scatter the seeds thinly over the top, press in, and cover very lightly with a little silver sand. To prevent the soil from drying too readily, the plan of placing a little moss over the soil is often practised; this must not be allowed to remain after the seeds begin to germinate. The pans may be placed in gentle heat, or in a cold frame; and shading from sunshine is necessary. February and March are the best seasons for sowing. When the plants come up, and are large enough to handle, they should be pricked off in pans of soil similar to that in which they have previously been growing, and be kept shaded and close until re-established. Afterwards, they may gradually have air and light admitted to harden them. Cuttings intended for propagating should be made of partially-ripened wood, inserted in sandy peat, and kept close and shaded. After they have callused, a slightly higher temperature may be allowed than at first, such as a gentle hotbed affords. Layering may be practised in autumn or spring, when the parent plant is sufficiently dwarf to allow of its being done. Roots proceed from almost any part of the firm wood near the base, but only very slowly indeed. Grafting is one of the principal methods adopted for increasing established varieties of *Rhododendron*, the stocks used being procured from seedlings or cuttings obtained from medium or strong-growing common varieties or species of good constitution. Grafting is most extensively practised towards the latter part of summer, when the scions have become ripened; with the tender indoor species, it is best done in winter. Grafted plants require to be kept for a time in close frames until a union has been effected.

Culture of Indoor Greenhouse Rhododendrons. Many of these develop into very large bushes, where space can be afforded, and provision made for planting them out. Amongst the species may be specially mentioned the magnificent *R. Nuttallii*, also *R. arboreum*, *R. Aucklandii*, *R. Edgeworthii*, &c. An open, peaty soil suits best, and good drainage is essential, as large quantities of water are requisite in summer. Unless seeds are required, the whole of the seed-vessels should be carefully removed when flowering is over, and the plants should then, if possible, be kept rather close while making their annual growth. Specimens of the species above-named may also be grown successfully in large tubs or pots, as the root space required is not really so much as the size of head would suggest. All the beautiful hybrid greenhouse Rhododendrons are most desirable subjects for decorative purposes in cool houses. They are mostly free-growing, and exceptionally free-flowering, as, by affording what is known as a warm greenhouse temperature, some of the plants in a collection are nearly always to be seen in flower. Especially are these remarks applicable to the section raised from *R. jasminiflorum*, *R. javanicum*, &c., which require more heat in winter than *R. ciliatum*, *R. Edgeworthii*, and others mentioned above. The hybrids succeed in rather small pots; good turfy peat and some silver sand is the most suitable compost to use. The plants should be kept under glass, but subjected to plenty of air in summer after their annual growth has been made. Water must be very carefully administered, particularly after potting, or if signs of ill-health are apparent. Rain-water

Rhododendron—*continued.*

for these, as for all other hard-wooded plants, is much to be preferred to any other.

Culture of Hardy Outdoor Rhododendrons. Hardy Rhododendrons succeed under various conditions regarding situation and soil, but one thing is always fatal to the well-doing of most of them, namely, the presence of lime or chalk in the compost within reach of their roots. Naturally, they prefer a rather moist situation and partial shade, but these conditions are not absolutely necessary, as the plants are hardy enough to grow and flower splendidly where fully exposed to the sun. Peat and leaf soil are unquestionably best suited for Rhododendrons; but *R. ponticum* and its numerous beautiful varieties grow well where there is a good proportion of loam, provided the destructive ingredients already referred to are absent. It is generally necessary to have beds specially prepared for these plants, by taking out the ordinary soil and refilling with a prepared compost, If peat is procurable, it should form the bulk; leaf soil and sandy loam may be added more freely when they can be obtained more easily. Dried cow-manure is also a good addition. Prepared beds for Rhododendrons should, if possible, be from 2ft. to 2½ft. deep; it is far better to make them properly at first, and large plants require that depth, although they always root near the surface. Transplanting may best be performed in spring; but there are few shrubs that withstand it so well at any season, provided the balls are not kept long out of the ground, and watering is well attended to afterwards. Large standard specimens of the numerous beautiful hybrids are exceedingly telling in pleasure-grounds, either isolated or planted amongst other smaller plants of Rhododendrons, or such subjects as are usually grown with them, hardy Ericas, Kalmias, Pieris, &c. The *ponticum* hybrids form valuable forcing subjects; they may be lifted from the open ground after the flower buds are set, and potted up. If introduced to heat in early spring, the flowers soon expand, and showy specimens are thereby obtained early for greenhouse decoration.

R. ferrugineum and *R. hirsutum* are dwarf, free-flowering species, well adapted for planting in small beds by themselves, or in prepared borders in different parts of rock-gardens, &c. They are always dwarf and somewhat slow-growing, so that, if associated with the vigorous *ponticum* varieties, they are liable to become overgrown and smothered. All Rhododendrons have extremely small, fibre-like roots, which are disposed very close to, and even on, the surface of the soil. It is important that these be kept protected from the sun; if the foliage does not insure sufficient shade, a top-dressing of leaf soil, cocoanut-fibre refuse, or similar material, proves of great advantage through the summer time, when the roots require to be kept cool and moist.

The best-known species and varieties are described below. Except where otherwise indicated, all are shrubs, and require greenhouse treatment.

R. æruginosum (verdigris-coloured). A synonym of *R. campanulatum*.

R. albiflorum (white-flowered). *fl.* drooping, on fascicled, rarely solitary peduncles; calyx large, deeply cut into five brownish-green segments; corolla pure cream-white, twice as long as the calyx, rotate-campanulate, five-lobed; stamens ten, included. July. *l.* deciduous, elliptic-lanceolate, shortly petiolate, entire, glabrous, penninerved, 1in. to 1½in. long; stipules brown, early deciduous. Branches erect. *h.* 2ft. to 3ft. Rocky Mountains. Hardy. (B. M. 3670.)

R. album (white). *fl.* small, on pedicels 1in. to 1½in. long; calyx minute; corolla pale yellowish-white or cream-colour, broad-campanulate, its five lobes nearly equal, rounded, retuse; stamens ten; corymbs umbellate, terminal, shorter than the leaves. November. *l.* rather copious, spreading, 3in. to 4in. long, oblong-lanceolate, acute, on short, lepidoted petioles, glabrous and dark green above, thickly clothed with minute, ferruginous scales beneath. Branches clothed with reddish-brown bark. *h.* 1ft. Java. (B. M. 4972.)

R. Anthopogon (bearded-flowered).* *fl.* sulphur-coloured, glomerate; calyx with a short, five-lobed limb; corolla salver-shaped,

Rhododendron—*continued.*

with a woolly throat and a spreading limb of roundish, undulately-curled segments; stamens eight, inclosed. April and May. *l.* oval, rusty beneath from lepidoted tomentum, biennial, coriaceous, terminating in a reflexed mucrone. Branchlets downy. *h.* 1ft. to 1½ft. Central and Northern Asia, 1820. Hardy. (B. M. 3947.)

FIG. 366. FLOWERING BRANCHLET OF RHODODENDRON ARBOREUM.

R. arboreum (tree-like).* *fl.* white, rose, or blood-colour, disposed in dense heads; calyx absent; corolla campanulate; stamens ten. March to May. *l.* large, coriaceous, lanceolate, acute, cordate at base or attenuated into a thick petiole, of a beautiful green above, below impressed with netted veins, glabrous, silvery or ferruginous-pubescent. *h.* 20ft. to 25ft. Himalayas, 1820. A magnificent, half-hardy tree, sometimes attaining a circumference of 150ft. See Fig. 366. (P. M. B. i. 101; R. S. H. vi., under name of *R. Campelliæ.*) This species has been largely used for hybridising purposes; many of its progeny, however, are early-flowering, and liable to be injured by spring frosts. Some of them are mentioned herewith: *R. altaclerense* (B. M. 3423), *R. Russellianum* (S. B. F. G. ser. ii. 91), *R. Smithii* (S. B. F. G. ser. ii. 50), *R. undulatum* (S. B. F. G. ser. ii. 341), *R. venustum* (S. B. F. G. ser. ii. 288). The following are varieties:

R. a. album (white). *fl.* white, with some purple dots above on the inside. *l.* ferruginous beneath. (B. M. 3290; B. R. 1684.)

R. a. cinnamomeum (cinnamon-leaved). *fl.* white, with purple and yellow spots. *l.* cinnamon-coloured beneath. (B. R. 1982.)

R. a. c. roseum (rosy). A splendid sub-variety, having rose-coloured flowers 2½in. in diameter. (B. M. 3825.)

R. a. limbatum (bordered). *fl.*, corolla limb rose-colour, gradually fading into an almost pure white throat, marked at the base with a deep blood-red blotch, broad. Half-hardy. (B. M. 5311.)

R. a. puniceum (purple). *fl.* either purplish or of an intense red-scarlet colour; corolla segments sub-bilobed at apex, crenate, sub-undulated. *l.* covered below with velvety-silvery, adpressed pubescence. (B. R. 890 and H. E. F. 168, under name of *R. arboreum*)

R. a. roseum (rosy). *fl.* rose-colour. *l.* ferruginous beneath. (B. R. 1240; S. B. F. G. ser. ii. 339.)

R. argenteum (silvery). A synonym of *R. grande.*

R. Aucklandii (Lord Auckland's).* *fl.* the largest of the genus; calyx platter-shaped, 1½in. in diameter; corolla firm, rather fleshy, pure white, tinged with pink, veiny; tube short, yellowish and rose-coloured towards the base; limb spreading, 3in. to 5in. in diameter; peduncles longer than the petioles, red or green. May. *l.* variable in size and breadth, 4in. to 10in. long, coriaceous, oblong-elliptical, scarcely approaching to lanceolate, acute, cordate at base, full green above, paler below; petioles 2in. long. Branches sub-erect, copiously leafy. *h.* 4ft. to 8ft. Sikkim, 1850. (R. S. H. xi.) SYN. *R. Griffithianum Aucklandii* (B. M. 5065).

R. barbatum (bearded). *fl.* deep puce or blood-colour, moderate-sized, collected into a compact, globose head, 4in. to 5in. in diameter; calyx large, scarcely silky, deeply cut into five leaf-like lobes ½in. long. *l.*, when young, sparingly hairy and ciliated; adults 5in. to 7in. long, 1½in. to 2in. or more wide, elliptic-lanceolate, acute, rather broader above the middle; margins reflexed

Rhododendron—*continued.*

and rough with hard ciliæ; petioles ½in. long, slightly tubercled, and beset with long, rigid, black setæ or hairs, which often extend a little way up the midrib beneath. Main trunks few, clothed with reddish bark; branches numerous. *h.* 40ft. to 60ft. Sikkim, 1829. Half-hardy tree. (F. d. S. 469; R. S. H. 3.)

R. b. Smithii (Smith's). A variety differing from the type in having the under surface of the leaves furfuraceous sub-tomentose. SYN. *R. Smithii* (B. M. 5120).

R. blandfordiæflorum (Blandfordia-flowered).* *fl.* often green before expansion, afterwards becoming more or less of a cinnabar or brick-red or orange-red on the upper part of the tube and limb, sometimes altogether green, at others red, even in the bud; corolla 1in. to 2½in. long; stamens ten; heads five to ten-flowered. *l.* 2in. to 3in. long, coriaceous in luxuriant plants, lanceolate, acuminate, shortly petiolate, ferruginously lepidoted beneath. Branchlets slender, twiggy, lepidoted. *h.* 8ft. Himalayas, 1851. (B. M. 4930.)

R. Boothii (Booth's). *fl.* yellow, campanulate, disposed in many-flowered corymbs; calyx leaf-like, membranous, the segments oval, obtuse, glabrous. *l.* thickly coriaceous, rhomboid, ovate, acuminate, 4in. to 5in. long, 2in. to 2½in. broad, scaly beneath, densely ciliated on the margins. *h.* 5ft. to 6ft. Bhotan. This is found growing as an epiphyte on Oak-trees in its native place. (I. H. 1858, 174.)

R. Brookeanum (Sir James Brooke's). *fl.* many, in a large, loose, terminal umbel, on rather short peduncles; calyx absent; corolla full orange or golden-tawny, between bell and funnel-shaped, large, thick, with an elongated tube and a limb of five crisped lobes; stamens ten, as long as the tube. April. *l.* 6in. to 9in. long, firm, oblong-lanceolate, acute, full green above, the same or a little paler beneath, and there sparingly dotted with minute scales; petioles dark purple, very short, broad, and thick. Branches dark purple, stout. Borneo, 1848. Stove epiphytal or terrestrial shrub. (B. M. 4935; F. d. S. v. 480; G. C. 1871, 236.)

R. B. gracilis (slender).* *fl.* pale yellow, freely produced on young plants in trusses of ten to twelve. *l.* light green, elliptic-lanceolate. 1871. (J. H. S. iii. 85.)

R. californicum (Californian). *fl.* many, in terminal umbels; calyx small, slightly pilose; corolla rose-purple, broadly campanulate, the lobes yellow-spotted within, and undulated; stamens ten, shorter than the corolla. June. *l.* somewhat obovate-elliptic, coriaceous, acute, glabrous, shortly petiolate, one-coloured, paler beneath. *h.* 3ft. to 8ft. California. Hardy. (B. M. 4863.)

R. calophyllum (beautiful-leaved).* *fl.* in corymbs of four or five, on short, scaly peduncles; calyx very scaly, short, five-lobed; corolla pure white, slightly tinged with yellow-green, 3in. long and broad, tubular-campanulate, somewhat ringent, deeply five-lobed; stamens eighteen to twenty, included. May. *l.* 3in. to 5in. long, firm, rigid, coriaceous, ovate, oblong, or somewhat elliptical, dark glossy-green, obtuse at base, very acute at apex, glaucous beneath when young, ferruginous when old, with innumerable scales. Branches spreading, stout, terete. *h.* 3ft. Bhotan. (B. M. 5002.)

R. camelliæflorum (Camellia-flowered). *fl.* solitary or twin, on short, curved peduncles; calyx segments thick, obtuse; corolla pure white, with a faint rosy tinge, rather thick, lepidoted, 1½in. across. April. *l.* at the tips of the branches, differing in little but size from those of *R. Maddeni*, 2½in. to 3in. long. Stems 2ft. to 6ft. long, seldom thicker than a goose-quill. Branches long, generally pendulous. Sikkim, 1851. (B. M. 4932; R. S. H. xxviii.)

R. campanulatum (bell-flowered).* *fl.* pale lilac, with a few purple spots, or rose-colour, corymbose; calyx lobes very short; corolla campanulate, about 2in. in diameter, with flat, entire lobes, rounded at the apex; pedicels glabrous. April. *l.* elliptic, mucronate, obtuse or sub-cordate at base, below greyish-powdery, above, as well as the petioles and branchlets, glabrous. *h.* 4ft. Sikkim, 1825. Half-hardy. (B. M. 3759; L. B. C. 1944; P. M. B. xvi. 193; S. B. F. G. ser. ii. 241.) SYN. *R. æruginosum* (R. S. H. xxii.).

R. c. æruginosum (verdigris-coloured). A form having the under surface of the leaves clothed with verdigris-coloured tomentum.

R. c. Batemani (Bateman's). A larger-flowered, more robust-habited form. (B. M. 5387.)

R. c. Wallichii (Wallich's). *fl.*, corolla more brightly coloured than in the type. *l.* elliptic or oblong, loosely tomentose beneath, often caducous; petioles densely woolly. (R. S. H. v.)

R. campylocarpum (curved-fruited).* *fl.* honey-scented, horizontal and nodding, six to eight in a terminal head, on slender pedicels; calyx five-lobed, glandulose; corolla tinged of a sulphur hue, and always spotless, truly campanulate, nearly 2in. long, broader across the five spreading lobes, which are finely veined. June. Capsules curling upwards. *l.* coriaceous, but not thick, 2in. to 3½in. long, 1¾in. to 2in. broad, cordate at base, rounded and mucronate at the apex, on slender petioles ¾in. long. Ultimate branchlets, as well as the peduncles and pedicels, glandular-pilose. *h.* 6ft. Sikkim, 1851. A twiggy, branched bush. (B. M. 4968; R. S. H. xxx.)

R. catawbiense (Catawban). *fl.* lilac-purple; calyx lobes small; corolla broadly campanulate; pedicels (and capsule) rusty-pubescent. July. *l.* oval or oblong, rounded at both ends, smooth,

Rhododendron—*continued.*

3in. to 5in. long, pale beneath. *h.* 3ft. to 6ft. Mountains of Southern United States, 1809. Hardy. (B. M. 1671.)

R. caucasicum (Caucasian).* *fl.* corymbose; corolla rose-coloured outside, white within, spotted with green at the throat, campanulate-infundibuliform. August. *l.* lanceolate, ovate, or nearly obovate, slenderly veined above, beneath clothed with much-adpressed, ferruginous tomentum, the margins revolute. Stems diffuse or decumbent. *h.* 1ft. Caucasus, 1803. Hardy. (B. M. 1145.) The following are handsome varieties of this species:

R. c. albiflorum (white-flowered). A hybrid with white flowers, not so desirable as the type. (B. M. 3811, under name of *R. c. hybridum.*)

R. c. flavidum (yellowish-flowered). *fl.* straw-colour, spotted with green.

R. c. Nobleanum (Noble's). *fl.* of an intense rose-colour both outside and within. *l.* oblong.

R. c. pulcherrimum (very pretty). *fl.* rose-colour. *l.* oblong. A pretty hybrid between *R. arboreum* and *R. caucasicum.* (B. R. 1820, under name of *R. pulcherrimum.*)

R. c. stramineum (straw-coloured). *fl.* straw-colour, fulvous-spotted within. *l.* oblong. (B. M. 3422.)

R. Chamæcistus (Chamæcistus). A synonym of *Rhodothamnus Chamæcistus.*

R. Championi (Champion's). *fl.* white, tinged with delicate rose-colour, or white with the upper lip pale yellow towards the centre, and copiously dotted with ochre; calyx hispid, deeply cleft into four rather long segments; corolla 4in. across, the tube rather short, campanulate; stamens ten; umbels four to six-flowered; peduncles hispid. April. *l.* shortly petioled, lanceolate, shortly acuminate, reticulated, flat, dark green above, rusty beneath, where the margins, costa, and veins, are clothed with short, bristly hairs. *h.* 7ft. Hong Kong, 1881. (B. M. 4609.)

R. ciliatum (ciliated).* *fl.* pale reddish-purple, inclined, in three to many-flowered, terminal heads; sepals veined, ciliated; corolla 1½in. long, and nearly as much across; tube rather contracted below; limb of five lobes, the upper one obscurely spotted. May. *l.* elliptic, acuminate, coriaceous, 2in., rarely 3in., long, sometimes obscurely cordate at the base; upper surface (except in age) pilose, even villous when young; beneath quite glabrous, covered with minute, ferruginous scales. *h.* 2ft. Sikkim. A small, more or less pilose or setose, hardy, rigid species. (R. S. H. xxiv.)

R. c. roseo-album (rose-and-white). *fl.* white, tinged with rose, larger than in the type. (B. M. 4648.)

R. cinnabarinum (cinnabar-red).* *fl.* rather small, nodding, usually four to eight in a loose head; calyx segments of various sizes; corolla brownish-red, with a long tube; the lobes rounded, spreading, and slightly acuminated; stamens ten, included. April and May. *l.* ovate or oblong-lanceolate, acute at both ends, 2in. to 3in. long, 1in. wide, dull green above, ferruginous beneath. Branches slender. Sikkim, 1851. Half-hardy. (R. S. H. viii.) *R. Roylei* (R. S. H. vii.) is nearly allied to this.

R. citrinum (citron-coloured). *fl.* drooping, fragrant, rather small, umbellate; calyx shortly five-lobed; corolla pale lemon-colour, more than ¾in. long, campanulate; limb of five nearly erect, retuse lobes; stamens five, included; anthers deep orange. May. *l.* on short petioles, spreading, the largest not more than 2in. long, elliptic-oblong, obtuse, glabrous, coriaceous, dark green above; beneath, paler, and dotted with minute, pale-greenish scales. Java, 1854. A small, stove species. (B. M. 4797.)

R. Clivianum (Duchess of Northumberland's).* *fl.* white, slightly tinged with pale pink, especially on the margins; within, profusely dotted with light purplish-red. A hybrid, believed to have been produced between *R. arboreum* and *R. catawbiense.* It is a perfectly hardy, strong-growing plant, but is well worthy of protection while in flower. (B. M. 4478.)

R. dahuricum (Dahurian).* *fl.* rose-coloured, solitary or in twos or threes at the tips of the branches, on short pedicels; calyx very shortly or scarcely five-toothed; corolla rotate-campanulate, not lepidoted. March. *l.* oval-oblong, mucronulate, glabrous, lepidoted, paler beneath, deciduous. *h.* 3ft. Dahuria, 1780. An erect, hardy species. See Fig. 367. (A. B. R. 4; B. M. 636; L. B. C. 1605.)

R. d. sempervirens (evergreen). *fl.* of an intense purple. *l.* persistent, dark green. (B. M. 1888; B. R. 194, under name of *R. d. atrovirens.*)

R. Dalhousiæ (Lady Dalhousie's).* Epiphytal Rhododendron. *fl.* lemon-scented, three to seven in an umbellate head, the spread of which is greater than that of the leaves; calyx large, deeply divided into five foliaceous lobes; corolla white, with an occasional tinge of rose, 3½in. to 4½in. long, and as broad at the mouth, campanulate, much like that of *Lilium candidum*; lobes very broad, waved, spreading; stamens ten; peduncles stout, nearly ½in. long. April to July. *l.* few, patent or reflexed, petiolate, 4½in. to 5in. long, elliptic-obovate, obtuse at base, attenuated below into a more or less downy footstalk about ½in. long, darkish-green, inclining to yellow above, beneath paler. Stems clothed with reddish, papery bark. Branches spreading, whorled. *h.* 6ft. to 8ft. Sikkim, 1850. A straggling, half-hardy

Rhododendron—*continued.*

epiphyte, especially found on Oaks and Magnolias. (B. M. 4718; F. d. S. 460; R. S. H. i. ii.)

R. D. hybridum (hybrid). A hybrid between *R. Dalhousiæ* and *R. formosum.* The flowers are as large as those of the former, but have derived a tinge of pink from *R. formosum*; the ciliated calyx also resembles that of the latter species, while the leaves are intermediate in size, and quite glabrous. (B. M. 5322.)

R. Edgeworthii (Edgeworth's).* *fl.* showy, inclined; calyx large, of five deep, spreading, coloured lobes, very downy on the back, the edges finely ciliated; corolla white, often tinged with blush or pale yellow; tube rather short, widening much at the mouth; limb more than 4in. across, spreading, of five nearly equal lobes; stamens ten; peduncles terminal or axillary, usually two or three together. May and June. *l.* 2in. to 4in. long, ovate-lanceolate, acute or suddenly acuminate, obtuse at base, the margins recurved, the upper surface singularly wrinkled from impressed, reticulated veins; petioles about ¾in. long. Sikkim, 1851. Shrub with straggling branches, often pendulous upon trees and rocks. The flowers are so fragrant that a few are sufficient to scent a large room. (B. M. 4936; F. d. S. 797-8; R. S. H. xxi.)

R. eximium (choice). A synonym of *R. Falconeri.*

FIG. 367. FLOWERING BRANCH OF RHODODENDRON DAHURICUM.

R. Falconeri (Dr. Falconer's).* *fl.* white, numerous, rather small, densely placed in small, globose heads; calyx very minute; corolla of ten rounded lobes; peduncles erect, elongated after flowering. May. *l.* very coriaceous, 8in. to 12in. long, 5in. to 7in. wide; upper side glossy-green, fading to yellow on the margins, which are quite plane; beneath, except on the midrib and reticulated veins, clothed with short, dense, pale ferruginous down; young leaves velvety-downy. Trunks two or three from the same point, often 2ft. in diameter. *h.* 30ft. Sikkim, 1850. Half-hardy tree. (B. M. 4924; F. d. S. 477-80; R. S. H. x.) SYN. *R. eximium.*

R. Farreræ (Mrs. Farrer's). *fl.* of a pale lilac-rose colour, terminal; calyx very shortly five-lobed; corolla campanulate, the lobes spreading and undulated. March. *l.* coriaceous, ovate, obtuse, mucronulate, slightly attenuated at base, reticulate-veined, hairy on both sides, the margins slightly recurved and ciliated; petioles, as well as the branchlets, villous-pilose. *h.* 3ft. China, 1829. Hardy. (S. B. F. G. ser. ii. 95.)

R. ferrugineum (rusty-leaved).* Alpine Rose. *fl.* of a beautiful scarlet colour, marked with ash-coloured or yellow dots, disposed in umbels; calyx lobes five, short, obtuse; corolla funnel-shaped. May to July. *l.* oblong, attenuated at both ends, glabrous and shining above, thickly beset with ferruginous dots beneath, and much resembling those of the Box-tree; when young, ciliated, with a few hairs beneath. *h.* 1ft. Europe, 1752. Hardy. (J. F. A. 255; L. B. C. 65.)

R. f. albiflorum (white-flowered). A variety having white flowers. (S. B. F. G. ser. ii. 258, under name of *R. f. album.*)

R. formosum (beautiful).* *fl.* few, terminal; calyx small, scarcely lobed; corolla white, slightly tinged with purple and yellow,

Rhododendron—*continued.*

large, sub-campanulate, with an angular tube. April. *l.* lanceolate, obtuse, shining above, beneath (as well as the outside of the corolla) lepidote. Branches smooth. *h.* 3ft. to 8ft. Eastern Himalaya, 1815. (B. M. 4457.)

R. Fortunei (Fortune's).* *fl.* pendulous, fragrant, loosely clustered in heads of eight to ten, on peduncles ½in. to 1in. long; calyx discoid, small; corolla of a fine pale rose-colour, shortly campanulate, 3in. to 5½in. in diameter, with seven rounded lobes; stamens fourteen. May. *l.* 5in. to 7in. long, oblong or linear-oblong, acute, bright green, but opaque above, glaucous below, acute, rounded or cordate at base; petioles red-brown, ½in. to 1in. long. Branches very stout, terete. *h.* 12ft. China, 1859. Hardy. (B. M. 5596.)

R. fulgens (brilliant). *fl.* on short pedicels, in dense heads; calyx obsolete or very short; corolla of a deep bright blood-red, somewhat fleshy, highly polished and shining, campanulate, with a slightly compressed tube, and a limb of five recurved lobes. June. *l.* broadly obovate or ovate-elliptic, rounded at apex, cordate at base, 4in. long, 3in. broad, tolerably constant, coriaceous, glossy above, densely woolly beneath, the margins recurved. *h.* 4ft. Eastern Himalaya, 1851. (B. M. 5317; F. d. S. 789; R. S. H. xxv.)

R. glaucum (glaucous).* *fl.* erect or inclined; calyx deeply five-parted, with leafy lobes; corolla pale pinkish-purple, above 1in. long, and about as broad, with a campanulate tube and a moderately spreading limb of five emarginate lobes; stamens ten, included. May. *l.* rather crowded at the tips of the branches, 1in. to 3in. long, usually 1in. to 1½in. broad, shortly petioled, oblong or broadly lanceolate, obtuse, with a mucro, when old naked above; below glaucous, almost white, and dotted with copious little scales, which abound on young leaves, bracts, buds, peduncles, and calyx segments. *h.* 2ft. Sikkim, 1850. Half-hardy. (B. M. 4721; F. d. S. 672; R. S. H. xvii.)

R. grande (large).* *fl.* white, 2in. to 3in. long, 2in. to 2½in. in diameter; calyx very short, obscurely lobed; corolla limb of rather short segments; stamens ten; stigma swollen. March. *l.* obovate-oblong, acute, attenuated into the thick petioles, 6in. to 12in. long, 3in. to 5in. broad, nearly flat, glabrous, full green above, silvery-white beneath; when in bud, very beautiful, erect and silky, at first enveloped in large scales. Trunks solitary or two or three together, spreading, branched above. *h.* 30ft. Sikkim, 1850. Tree. SYN. *R. argenteum* (B. M. 5054; F. d. S. 473-6; R. S. H. ix.).

R. Griffithianum Aucklandii (Griffith's, Lord Auckland's var.). A synonym of *R. Aucklandii.*

R. hirsutum (hairy).* Alpine Rose. *fl.* pale red or scarlet, disposed in umbellate corymbs; calyx lobes oblong, obtuse; corolla funnel-shaped, the outside, as well as the calyx, having resinous dots; pedicels bristly. May to July. *l.* sub-elliptic, rigid-ciliated, ferruginous-dotted beneath, glabrous on both sides. *h.* 1ft. to 2ft. South Europe, 1656. Hardy. (B. M. 1853; J. F. A. 98; L. B. C. 479.)

R. Hodgsoni (Hodgson's). *fl.* delicate pale purple or rose-colour, in heads 4in. to 6in. in diameter; calyx obsolete; corolla tube 1½in. long, broadly campanulate; limb spreading, 2in. to 2½in. across, eight-lobed; stamens sixteen to eighteen; anthers dark purple-brown. May and June. *l.* terminal on the ultimate branches, spreading, 1ft. to 1½ft. long, oblong-elliptic, obovate or ovate-lanceolate, obtuse, nearly cordate at base, thickly coriaceous, glabrous and glossy-green above, the margins recurved; beneath, except the midrib, clothed with pale silvery-white, rarely ferruginous tomentum; petioles very stout, 1in. to 2in. or more long. Bark pale flesh-colour. *h.* 12ft. to 20ft. Eastern Himalaya, 1851. A small tree, branching from the base. (B. M. 5552; R. S. H. xv.)

R. Hookeri (Hooker's).* *fl.* red, in many-flowered corymbs; calyx ample, campanulate, obsoletely lobed; corolla campanulate, with five deeply bilobed lobes; stamens ten. April. *l.* coriaceous, highly glabrous, rigid, oblong-oval, obtuse, long-stalked, rounded at base, glaucescent beneath, 3in. to 5½in. long, 1in. to 1⅓in. broad; nerves furfuraceous-pubescent; petioles thick, 1in. long. *h.* 12ft. to 14ft. Bhotan. An erect species. (B. M. 4926.)

R. jasminiflorum (Jasmine-flowered).* *fl.* many, in terminal umbels; calyx obscurely five-lobed; corolla white, slightly tinged with rose below the limb; tube 2in. long, straight, scarcely gibbous at the base; limb spreading, of five obovate, wavy lobes; stamens ten; anthers red. May. *l.* crowded towards the tips of the branches; lowermost ones sub-verticillate on short petioles, obovate-oblong, rather acute, glabrous, nearly coriaceous. *h.* 2ft. Malacca, 1849. (B. M. 4524; L. & P. F. G. i. 70.)

R. javanicum (Javan).* *fl.* fascicled, eight to twelve or more, large and handsome; calyx very small, five-lobed; corolla orange-coloured, with scattered red spots, between funnel and bell-shaped; tube gradually widening upwards into a limb of five nearly equal lobes; stamens ten, slightly ascendent; anthers dark purple. All seasons. *l.* scattered, oblong-oval, or approaching obovate, acute, tapering into a short petiole, naked above, beneath minutely dotted with very small, brown, peltate scales. Branches spreading. *h.* 4ft. Java, 1847. (B. M. 4336; P. M. B. xv. 217.)

R. Jenkinsii (Jenkins'). *fl.* white, four to six in a corymb; calyx segments short; corolla lobes sub-equal, rounded, obtuse; style

Rhododendron—*continued.*

very long. *l.* shortly petioled, oblong-lanceolate, acute, cuneate at base, 4in. to 5½in. long, 1in. to 1½in. broad, glaucous and densely scaly beneath. *h.* 6ft. to 7ft. Bhotan. (R. G. ix. 277.)

R. kamtschaticum (Kamtschatka). *fl.*, calyx lobes oblong, leaf-like; corolla purplish-red, striped inside with dark purple, nearly 1½in. in diameter, the lobes obtuse and not callous at the apex. July. *l.* oval, slightly acute, reticulated, five-nerved, naked, ciliated. Kamtschatka, North America, &c., 1802. A procumbent, hardy sub-shrub. (L. & P. F. G. i. 22, under name of *Rhodothamnus kamptschaticus.*)

R. Kendrickii latifolium (Kendrick's broad-leaved). *fl.* ten to fifteen in a rather loose, globose head; calyx of five small teeth; corolla bright scarlet, broadly campanulate, equally five-lobed; stamens ten. Spring. *l.* 4in. to 6in. long, about 1in. wide, generally undulated on the margins, more or less whorled, green on both surfaces; young ones (and other parts of the plant) clothed with reddish, glutinous hairs that disappear in age. Trunk 7in. to 8in. in girth. Bhotan, 1859. Hardy. (B. M. 5129.)

R. Keysii (Keys'). *fl.* red, yellow, small, five or six in a corymb; calyx five-toothed; corolla tubular or urceolate, the lobes ovate, obtuse; stamens ten; filaments exserted. July. *l.* 2½in. to 3in. long, about 1in. broad, ovate-lanceolate, acute, glabrous, glaucous and scaly beneath. *h.* 2ft. to 6ft. Bhotan, 1851. (B. M. 4875; F. d. S. 1110.)

R. lanatum (woolly).* *fl.* rather large, inclined, in terminal corymbs of six to ten; calyx minute, five-toothed; corolla yellowish-white or pale sulphur-colour; tube broad-campanulate, within, above, and three of the upper lobes in part, red-dotted; limb 2in. to 2½in. across, of five very spreading, entire lobes. June. *l.* at the tips of the branches, 3½in. to 5in. long, about 2in. broad, obovate or elliptical, obtuse, shortly mucronate, rather acute, or at most obtuse, at the base; under surface, as well as ultimate branchlets, peduncles, and petioles, covered with adpressed, white or tawny, cottony tomentum. Trunk 6in. in diameter. Sikkim, 1851. A large shrub or small tree. (F. d. S. 684; R. S. H. xvi.)

R. lapponicum (Lapland). *fl.* violet-purple, few in an umbel; corolla open bell-shaped, dotted, with a short tube and a rotate limb; stamens five to ten. July. *l.* elliptic, obtuse, ½in. long, rigid, persistent, and, as well as the branches, dotted with rusty scales. *h.* 6in. Arctic regions, 1825. Hardy, tufted shrub. (B. M. 3106.)

R. lepidotum (scaly).* *fl.* on slender pedicels, 1½in. to 2in. long; calyx lobes obtuse, somewhat leaf-like; corolla yellow or purple, 1in. across, lepidoted, especially on the outside of the tube; upper lobes spotted with green; anthers large, rich red-brown. May and June. *l.* obovate, lanceolate, or oblong, shortly apiculate, petiolate, pale green. *h.* 2ft. to 4ft. Sikkim, 1829. Half-hardy. (B. M. 4657; R. S. H. xxiii.,* under names of *R. elæagnoides* and *R. saligmum.*)

R. l. chloranthum (yellow-flowered). *fl.* of a yellowish-green colour, with green spots. (B. M. 4802.)

R. l. obovatum (obovate-leaved). *fl.* few, terminal; corolla maroon-purple, 1in. in diameter, salver-shaped; stamens usually eight, rarely ten. May. *l.* pale glaucous-green, ½in. to 1½in. long, emitting a resinous odour, obovate. A stout or slender, twiggy shrub, forming extended clumps 1ft. to 4ft. high, branching from a woody, tortuous rootstock. (B. M. 6450.)

R. Maddeni (Madden's).* *fl.*, calyx always small, five-lobed; corolla pure white, with a faint blush, chiefly on the upper lobe, 3½in. to 4in. long, and as much across; tube sparingly lepidoted, funnel-shaped; limb very large, spreading, of five rounded, entire lobes; stamens eighteen to twenty, as long as the tube; peduncles about three, short and stout. June to August. *l.* abundant, elliptic-lanceolate, acute or acuminate, 4in. to 7in. long, gradually tapering to rather short, ferruginous petioles, frequently pendulous; young ones entirely, perfect ones usually beneath only, clothed with dense, white squamules, which become ferruginous with age. *h.* 6ft. to 8ft. Sikkim, 1850. Half-hardy. (B. M. 4805; F. d. S. 912; R. S. H. xviii.)

R. malayanum (Malayan). *fl.* nodding, ⅜in. long, in terminal, few-flowered umbels, on short, curved peduncles; calyx minute, five-toothed; corolla dull scarlet; tube ⅜in. long, gibbous at base; limb flat, horizontal, ⅛in. to ¼in. across; stamens ten. Summer. *l.* 3in. to 4in. long, elliptic or elliptic-lanceolate, acute at both ends, coriaceous, narrowed into a petiole ⅛in. to ⅜in. long, dark green above, red-brown beneath. Branches red-brown. Branchlets, leaves beneath, petioles, pedicels, calyx, ovary, and corolla (sparingly), clothed with red-brown, lepidote scales. Malayan Archipelago, 1854. A large, stove shrub or small tree. (B. M. 6045.)

R. maximum (greatest). American Great Laurel. *fl.* on viscid pedicels; corolla pale rose-colour or nearly white, greenish in the throat on the upper side, and spotted with yellow or reddish, 1in. broad, campanulate. July. *l.* elliptic-oblong or lanceolate-oblong, 4in. to 10in. long, very thick, acute, narrowed towards the base, very smooth, with somewhat revolute margins. *h.* 6ft. to 20ft. North America, 1756. Hardy shrub or tree. (B. M 951.)

R. m. hybridum.(hybrid). *fl.* fragrant, often as large as those of *R. ponticum*; corolla pale purplish, with acute lobes.

Rhododendron—*continued.*

l. attenuated at base, scarcely glabrescent beneath. Garden hybrid. (B. M. 3454.) *R. m. bigener* (B. R. 195) is almost identical with this.

R. Metternichii (Metternich's).* *fl.* rose-coloured, sub-campanulate, disposed in corymbose heads. Spring. *l.* oblong or obovate-oblong, coriaceous, ferruginous-tomentose beneath. Japan, 1870. Hardy shrub. (S. Z. F. J. 9.)

R. nilagericum (Neilgherries). *fl.* pink, in a large, terminal, capitate raceme; calyx small, very shortly five-lobed; corolla campanulate, the segments undulated, rounded, and bilobed. May. *l.* elliptic or oblong, sub-obtuse, acute, reticulately veined, the margins revolute, above opaque, beneath densely clothed with loose, ferruginous tomentum. *h.* 25ft. Neilgherries, 1840. Tree. A variety of *R. arboreum.* (B. M. 4381; F. d. S. 1030-1.)

R. niveum (snowy-leaved). *fl.* rather numerous, moderately large, on short, tomentose peduncles; calyx very small; corolla externally yellowish-lilac, internally pale lilac, blotched with deeper lilac, and at the inner base having five deep blood-purple spots, broadly campanulate, narrow at base; limb five-lobed, retuse and slightly waved; stamens ten, included. May. *l.* moderately large, spreading, opaque on both sides, obovate-lanceolate, tapering below into a short footstalk; young leaves white-tomentose all over, afterwards glabrous above, clothed beneath with white, appressed, flocculent tomentum. Sikkim, 1850. Shrub. (B. M. 4730.)

R. n. fulvum (tawny). *fl.* of a deeper purple colour, and with larger trusses, than in the type. *l.*, under-surface buff-coloured. Sikkim, 1885. A handsome plant. (B. M. 6827.)

R. Nuttallii (Nuttall's).* *fl.* white, scarcely rosy, fragrant, in corymbs of four to six; calyx lobes large, rather thick, oblong-oval, obtuse; corolla sub-campanulate, 4½in. to 5in. long, five-lobed; stamens ten. May. *l.* large, coriaceous, oval, obtuse at both ends, apiculate, below closely reticulated with dark scales. *h.* 12ft. to 30ft. Bhotan, 1859. Shrub or tree. In a wild state, this frequently occurs as an epiphyte on the branches of large trees. (B. M. 5146.)

R. parvifolium (small-leaved). *fl.* pale rose, in small, compact, terminal umbels; calyx small, five-toothed; tube half as long as the five-lobed, sub-campanulate limb. Spring. *l.* ½in. to ¾in. long, oblong, acute, attenuated at base, scaly on both sides, green above, rusty beneath. Baiacul, 1877. An erect, flexuously-branched, hardy species. (R. G. 902.)

R. pendulum (pendulous). *fl.* small; calyx large in proportion, deeply cut into five lobes; corolla pure white, about 1in. in diameter, externally lepidote; tube very short, gradually expanding into a five-lobed limb; stamens ten. Spring. *l.* chiefly at the tips of the ultimate branches, on short petioles, spreading, between elliptic and oblong, acute, mucronate, 1½in. to 2in. long, about ¾in. broad, the margins recurved, beneath densely ferruginous-tomentose. Stems 3ft. to 4ft. long. Sikkim. An epiphyte on trees. (F. d. S. 662; G. C. n. s., xvii. 429; R. S. H. xiii.)

FIG. 368. FLOWERING BRANCHLET OF RHODODENDRON PONTICUM.

R. ponticum (Pontic). *fl.* purple, often spotted on the upper lobe, about 2in. in diameter, disposed in short, terminal corymbs; calyx lobes sub-acute, very short; corolla campanulate-rotate, the lobes sometimes lanceolate and acute, sometimes obtuse. May. *l.* oblong-lanceolate, attenuated at both ends, glabrous, pale or slightly ferruginous beneath. *h.* 6ft. to 12ft. Asia Minor, 1763. Hardy. See Fig. 368. (B. M. 650.) Of this species, there are several varieties; the following call for mention:

R. p. azaleoides (Azalea-like). *fl.*, corolla lobes much undulated, unspotted. *l.* lanceolate, sub-deciduous. Hybrid. (A. B. R. 379, under name of *R. p. deciduum.*)

R. p. myrtifolium (Myrtle-leaved). *fl.* purplish, unspotted; corolla scarcely 1in. in diameter. *l.* smaller than in the type, being about 2in. long. (L. B. C. 908, under name of *R. myrtifolium.*)

R. punctatum (dotted). *fl.* in dense corymbs; calyx lobes small, rounded, sometimes minute; corolla rose-colour, spotted within, somewhat funnel-shaped, longer than the pedicels. May and June. *l.* elliptic, 2in. to 3in. long, acute at each end (sometimes 1in. to 1½in. long, oval or obovate and obtuse), glabrous; under surface, as well as the corymbs, thickly dotted with resinous globules. *h.* 4ft. to 6ft. North America, 1786. (A. B. R. 36; W. D. B. 162A, under name of *R. p. minus.*)

R. p. majus (larger). *fl.*, corolla unspotted, larger than in the type. *l.* also larger. (B. R. 37.)

R. retusum (blunt-leaved). *fl.* somewhat drooping, six to nine in an umbel, on red, hairy peduncles about ¾in. long; calyx minute, yellow-green, five-toothed; corolla bright scarlet without, yellowish inside the tube, 1¼in. to 1½in. long, tubular-infundibuliform, the base ventricose, the limb moderately spreading; stamens ten, a little exserted. May. *l.* 2in. to 2½in. long, almost sessile, oblong or elliptic-obovate, evergreen, coriaceous, spreading, glabrous, the margins recurved, the apex very obtuse, or often retuse; old ones slightly ferruginous beneath. Branches woody, brown in age. *h.* 1ft. to 2ft. Java, 1853. Stove. (B. M. 4859; F. d. S. 1044; I. H. 70.)

R. Rollisoni (Rollison's). *fl.* in a round and compact head like that of *R. arboreum*, but the colour is much richer, being a deep blood-red, with a few dark spots at the bottom of the tube; calyx obsolete; corolla campanulate; peduncles tomentose. Spring. *l.* short, oblong, acute, obtuse or even cordate at base, wavy, very rugose and convex, revolute on the edges, covered beneath with close, pale brown wool. Ceylon. A small, hardy tree, with rugged, corky bark. In its native place, it attains a height of 30ft. and a girth of 4ft. (L. & P. F. G. i. 7.)

R. Shepherdii (Shepherd's). *fl.* of a deep scarlet, disposed in large, terminal heads like those of *R. barbatum*; calyx small, but distinct, four-lobed; corolla broadly campanulate, equally five-lobed; stamens ten. Spring. *l.* towards the ends of the branchlets, oblong or elliptic-oblong, acute, 3in. to 4in. long, about 1in. wide, deep green above, pale below, very thick and opaque; young ones deep purplish-red beneath. *h.* 6ft. Bhotan, 1859. (B. M. 5125.)

R. Smithii (Smith's). A synonym of *R. barbatum Smithii.*

R. Thomsoni (Thomson's).* *fl.* in a corymb of six to eight, on peduncles 1in. or more long; calyx red in the upper half, green below, ¾in. long and wide; corolla deep blood-red and glossy; tube elongated, 2in. long, often vertically compressed; limb large, much spreading, five-lobed, the upper one spotted; stamens ten, slightly exceeding the tube. June. *l.* 2in. to 3in. long, very broad, generally orbicular-ovate, but sometimes nearly orbicular, blunt and shortly mucronate at apex, quite glabrous, sub-glaucous below. *h.* 6ft. to 10ft., or sometimes 15ft. Sikkim, 1851. (B. M. 4997; F. d. S. 688-90; R. S. H. xii.)

R. triflorum (three-flowered). *fl.*, calyx very short, five-toothed or lobed; corolla greenish-yellow, resembling that of the common Azalea; limb nearly 2in. across, of five spreading segments; stamens eight, much exserted, the style much longer; peduncles usually in threes, ½in. to ¾in. long. May and June. *l.* often pendulous, on rather short, slender petioles, ovate-lanceolate, approaching oblong or elliptical, 2in. (rarely 3in.) long, acute at both ends, or cordate at base and sometimes blunt, beset with ferruginous squamules below. Branches twiggy. *h.* 4ft. to 6ft. Sikkim, 1850. Half-hardy. (G. C. n. s., xviii. 45; R. S. H. xix.)

R. Veitchianum (Veitch's).* *fl.* pure white, three or four together from the apex of a branch; corolla very large, between campanulate and funnel-shaped, the margins of the limb singularly waved and crisped. May. *l.* 3in. to 4in. long, obovate, acute, mucronate, very shortly petiolate, glaucous and clothed with red or ferruginous scales beneath. *h.* 6ft. Moulmein, 1850. Half-hardy. (B. M. 4992.)

R. virgatum (twiggy). *fl.* very delicate rose-colour, axillary from the upper and more crowded leaves, nearly sessile, when fully expanded forming a leafy head. April. *l.* scattered, petiolate, short or oblong-lanceolate, acute and slightly mucronate. Branches twiggy, slender, the new shoots covered with copious, peltate scales. *h.* 1½ft. Sikkim-Himalaya, 1850. Half-hardy. (B. M. 5060.)

R. Wallichii (Wallich's). A form of *R. campanulatum.*

R. Wightii (Wight's). *fl.* on slender pedicels, 1in. to 1½in. long, faintly honey-scented, twelve to twenty in heads larger than those of *R. arboreum*; calyx obsolete; corolla pale straw-colour, stained and spotted with blood-colour on the inside of the tube and upper lobes, large and very beautiful, truly bell-shaped, five-lobed at the insertion of the pedicel; stamens ten. June. *l.* 6in. to 8in. (rarely 10in.) long, 2½in. to 3in broad, very coriaceous,

Rhododendron—*continued.*

rather flat, deep green above, covered with rusty-cinnamon tomentum beneath, rarely pale and nearly white in the young foliage; petioles ½in. long, stout. *h.* 6ft. to 14ft. Sikkim, 1851. A small, shrubby tree. (R. S. H. xxvii.)

R. Wilsoni (Wilson's). A hybrid between *R. ciliatum* and *R. glaucum*. It has the foliage of the former without the hairs, and is destitute of the glaucous hue of the latter. The corolla is longer than in *R. glaucum*, but with a prevalence of the same rose-colour, not verging to white, as in *R. ciliatum*. (B. M. 5116.)

R. Windsori (Windsor's). *fl.* many in a crowded head; calyx lobes elongated, tapering; corolla deep crimson-scarlet, the lobes all emarginate; stamens ten. Spring. *l.* coriaceous, obovate-lanceolate, acute, 4in. to 5in. long, 1in. to 1½in. broad, strongly

Rhododendron—*continued.*

new, 1866. LADY SKELMERSDALE, pure white. LORD WOLSELEY, pale buff-yellow; flowers large, new, 1866. MAIDEN'S BLUSH, blush-white. PRINCESS ALEXANDRA, pure white; flowers waxy; very beautiful. PRINCESS ALICE, white, tinged pink. PRINCESS FREDERICA, pale buff. PRINCESS ROYAL, pink or rose-coloured; one of the oldest and best-known hybrids. TAYLORI (see Fig. 369, for which we are indebted to Messrs. James Veitch and Sons), pink, tube of corolla white.

Hardy Rhododendrons. Hybrids of *R. ponticum*. ACHIEVEMENT, clear rosy-scarlet, white centre. ALBUM GRANDIFLORUM, blush; fine truss and foliage. ALEXANDER DANCER, bright rose, lighter centre; one of the finest. ATROSANGUINEUM, intense blood-red; one of the hardiest. AUGUSTUS, purplish-crimson or

FIG. 369. FLOWERING BRANCHLET OF RHODODENDRON TAYLORI.

reticulated and pinnately nerved, shining, white and silvery beneath, at length pale brown. Bhotan. A small, half-hardy tree. (B. M. 5008.)

Varieties. There are almost endless varieties of *R. ponticum* in cultivation, and the hybrids which require greenhouse treatment are now becoming somewhat numerous, as many of the species and their progeny have been, from time to time, used for seed-raising. The following list includes a selection of good kinds, but very many others have, of necessity, to be omitted:

Hybrid Greenhouse Rhododendrons. COUNTESS OF HADDINGTON, pink, changing to blush-white. COUNTESS OF SEFTON, white, tinged rose. DUCHESS OF CONNAUGHT, vermilion-red; of good substance. DUCHESS OF EDINBURGH, rich, glowing crimson. DUCHESS OF SUTHERLAND, white. DUCHESS OF TECK, buff. FAVOURITE, delicate satiny-rose; large, compact trusses; plum-colour. BARCLAYANUM, deep rosy-crimson; late. BLANDYANUM, rosy-crimson; extra fine. CANDIDISSIMUM, blush, changing to white. CARACTACUS, rich purplish-crimson; fine truss; one of the best. CHANCELLOR, purplish-lilac, spotted. CHARLES DICKENS, dark scarlet; fine habit and foliage. DELICATUM, blush, changing to white, with a distinct brown spot; fine habit. DUCHESS OF BEDFORD, deep rose, light centre. EVERESTIANUM, rosy-lilac, spotted and fringed; free-flowering. FAIR HELEN, pure white, marked with rich yellow spot. FREDERICK WATERER, crimson; very showy. GEORGE PAUL, crimson, finely spotted; free-flowering. HELEN WATERER, centre white, edged with crimson. H. W. SARGENT, crimson; very large trusses. IAGO, pale rose, spotted. JAMES MACINTOSH, rosy-scarlet; splendid habit and foliage. JAMES NASMYTH, rosy-lilac, blotched maroon; large truss. J. MARSHALL BROOKS, rich scarlet, bronze spot; distinct. LADY ARMSTRONG, pale rose, much spotted; beautiful. LADY ELEANOR CATHCART, pale rose, spotted chocolate. LUCIDUM, purplish lilac, brown spots; free-flowering. MARCHIONESS OF LANSDOWNE, pale rose, intense black spot; distinct and

Rhododendron—*continued.*

telling. MICHAEL WATERER, crimson-spotted; fine. MINNIE, blush-white, spotted with chocolate; distinct. MONT BLANC, white, dwarf, and free-flowering. MRS. JOHN CLUTTON, white; one of the best in cultivation. MRS. WILLIAM BOVILL, rich rosy-scarlet; one of the most attractive. MURILLO, rich crimson. NERO, dark rosy-purple, richly spotted. PRINCESS MARY OF CAMBRIDGE, light blush, deeper edging. PURITY, white, faint yellow eye; very showy. REEDIANUM, bright cherry; very pretty. ROSABEL, pale rose; fine foliage and habit. SIR ISAAC NEWTON, plum-colour, shaded and spotted. SIR THOMAS SEBRIGHT, rich purple, distinct bronze blotch. SNOWFLAKE, pure white; conical truss; distinct and beautiful. STANDARD OF FLANDERS, blush, distinctly spotted; very showy. STELLA, pale rose, intense chocolate blotch; free-flowering. SYLPH, bright rosy-pink; fine truss. THE QUEEN, blush, changing to white; fine shape. TITIAN, clear rosy-scarlet; one of the best. VANDYCK, rosy-crimson; good. VERSCHAFFELTII, blush, much spotted. VESTAL, pale rose, much spotted; fine truss. WILLIAM DOWNING, rich dark puce, finely blotched.

RHODOLEIA (from *rhodon*, a rose, and *leios*, smooth; perhaps referring to the rose-like flowers and the spineless stems). ORD. *Hamamelideæ*. A genus comprising a couple of species of small, highly glabrous, greenhouse or stove trees, with the habit of *Rhododendron*; one is from Hong Kong, and the other a native of Sumatra. Flowers hermaphrodite, about five in an axillary, pedunculate, nodding head, girded by a coloured, many-leaved involucre; petals rose-colour, two to four, very unequal, clawed; stamens seven to ten, inserted with the petals. Leaves crowded at the tips of the branchlets, spreading, alternate, long-petioled, evergreen, glaucous beneath, oblong, entire, thickly coriaceous. For culture of *R. Championi*—the only species introduced—*see* **Gardenia.**

R. Championi (Champion's). *fl.* 2½in. in diameter; outer involucral leaflets (sepals) about twelve; inner ones (petals) about eighteen. February. *fr.* of five radiating capsules, each the size of a small hazel-nut. *l.* bright green, elliptic-obovate, obtuse. Hong Kong, 1852. (B. M. 4509.)

RHODOMYRTUS (from *rhodon*, a rose, and *Myrtos*, Myrtle; in allusion to the rose-coloured flowers of some species, and the alliance to the Myrtle). ORD. *Myrtaceæ*. A genus containing five species of stove or greenhouse, villous or tomentose trees or shrubs; one is dispersed over tropical Asia, from the Indian Archipelago as far as China, and the rest are natives of Eastern Australia. Flowers often rather large, axillary; calyx tube scarcely or not produced above the ovary; limb of four or five herbaceous, persistent segments; petals four or five, spreading; stamens densely many-seriate, free; peduncles one to three-flowered, rarely racemosely five to seven-flowered, rather long or very short. Leaves opposite, penniveined or triplinerved. *R. tomentosa* is the only species known to gardeners. For culture, *see* **Myrtus.**

R. tomentosa (tomentose).* Hill Gooseberry; Indian Hill Guava. *fl.* rose-colour; calyx five-cleft; peduncles one to three-flowered, shorter than the leaves, with two ovate bracteoles beneath the flowers. June. *l.* ovate, the younger ones velvety above, cano-tomentose beneath, three-nerved; lateral nerves submarginal. *h.* 5ft. China, &c., 1776. Greenhouse shrub. (B. M. 250, under name of *Myrtus tomentosa.*)

RHODORA (from *rhodos*, a rose; alluding to the colour of the showy flowers). ORD. *Ericaceæ*. A monotypic genus. The species is a hardy, deciduous shrub, included by Bentham and Hooker, under **Rhododendron** (which *see* for culture).

R. canadensis (Canadian).* *fl.* rose-purple (rarely white), disposed in shortly-stalked, umbel-like clusters, appearing rather earlier than the leaves, showy. *l.* oblong, whitish and downy beneath. *h.* 2ft. to 4ft. North America. (B. M. 474; T. S. M. 441.) The correct botanical name of this plant is *Rhododendron Rhodora.*

RHODORHIZA. Included under *Convolvulus.*

RHODOSPATHA (from *rhodon*, a rose, and *spatha*, a spathe; alluding to the colour of the spathe in some species). ORD. *Aroideæ* (*Araceæ*). A genus comprising six or seven species of stove, climbing, tropical American shrubs, with rooting branches. Flowers all hermaphrodite, or the lower ones female; spathe boat-shaped, rostrate, deciduous; spadix shorter than the spathe, dense-flowered, cylindrical, elongate-stipitate. Leaves

Rhodospatha—*continued.*

distichous, elliptic-oblong, acuminate, with numerous arcuate, parallel nerves; petioles about as long as the leaves, long-sheathed. The species introduced thrives in a compost of sandy loam and peat, and requires a moist atmosphere. Propagated by seeds, or by cuttings.

R. blanda (charming). *fl.*, spathe greenish-ochre; spadix rather long-stalked, cylindroid, loosely attenuated towards the apex. *l.* oblong-elliptic, slightly obtuse at base, loosely arcuate and narrowed towards the apex, acute. Brazil, 1860.

RHODOSTACHYS (from *rhodon*, a rose, and *stachys*, a flower-spike; alluding to the rose-coloured flowers of some species). SYN. *Ruckia.* ORD. *Bromeliaceæ*. A small genus (six or seven species have been described) of stove herbs, natives of Chili, Columbia, and Guiana. Flowers sub-sessile, on an hemispherical or shortly conical receptacle; sepals distinct above the ovary, erect, closely imbricated; petals free, imbricated, glandular, or with two small scales at the base within; heads terminal, sessile within an involucre of numerous floral leaves. Leaves rosulate, long-linear, slightly rigid, spinuloso-serrate. The only species introduced require culture similar to **Bromelia** (which *see*).

R. andina (Andine). *fl.* soft rose-colour, crowded on a hemispherical receptacle, each subtended by an oval-oblong, cuculate, cuspidate, toothed, bract. Summer. *l.* 1ft. to 1½ft. long, margined with robust spines, numerous, rigid, thick, fleshy, glaucous-green, powdered with white, arranged in a dense, regular rosette. *h.* 1ft. Andes of Chili, 1850. (R. H. 1885, 540.) SYNS. *Bromelia carnea*, *B. longifolia* (of Lindley) (L. & P. F. G. ii. 65). *R. grandiflora* and *R. littoralis* are probably only forms of this species.

R. bicolor (two-coloured). *fl.* rose-colour; inflorescence close, sessile, surrounded by a tuft of linear-ensiform, channelled, recurved, spiny-edged leaves. 1851. An interesting, almost stemless perennial. The following are probably slight forms: *Bromelia bicolor* (B. H. 1873, 14), *B. Joinvillei* (R. H. 1876, 10), *Hechtia pitcairniæfolia* (R. H. 1868, 211), *Ruckia Ellemeeti* (R. G. 571).

RHODOSTOMA. Included under **Palicourea** (which *see*).

RHODOTHAMNUS (from *rhodon*, a rose, and *thamnos*, a shoot or branch; alluding to the rosy colour of the flowers). ORD. *Ericaceæ*. A monotypic genus. The species is a small, hardy, branched shrub, in inflorescence and habit resembling **Azalea** (which *see* for culture).

R. Chamæcistus (Chamæcistus).* *fl.* pink, sub-erect, solitary at the tips of the branchlets, on long, slender peduncles; corolla rotate, nearly 1in. in diameter. May. *l.* scattered, shortly petiolate, elliptic-lanceolate, entire, setose-ciliated, evergreen, shining. Branchlets glabrous. *h.* 6in. Alps of Eastern Europe, 1786. (B. M. 488, under name of *Rhododendron Chamæcistus.*)

RHODOTYPOS (from *rhodon*, a rose, and *typos*, a type or model; the flowers resemble those of a Rose). ORD. *Rosaceæ*. A monotypic genus. The species is a hardy shrub, allied to **Kerria** (which *see* for culture).

R. kerrioides (Kerria-like).* White Kerria. *fl.* white, solitary, ample, terminating the branchlets, shortly pedicellate; calyx persistent, villous within; petals four, ample, orbiculate, shortly clawed. April. *l.* decussately opposite, petiolate, simple, ovate, acuminate, argutely serrated, silky beneath; stipules free, membranous. Branches decussate, twiggy. *h.* 15ft. Japan, 1866. (B. M. 5805; R. G. 505; R. H. 1866, Fig. 54, S. Z. F. J. 99.)

RHOEO (name not explained by its author). ORD. *Commelinaceæ*. A monotypic genus. The species is a stove, perennial herb, often classed under **Tradescantia** (which *see* for culture).

R. discolor (party-coloured).* *fl.* blue or purple, almost included within the bracts, many, umbellately-crowded; sepals and petals three, free; peduncles axillary, sometimes divided. June. *l.* much imbricated, rather large, narrow-lanceolate, sessile, and sheathed at base, often purplish beneath. Stem short, or wanting. Central America. (B. M. 1192, 5079; F. d. S. 1169-70 and Ref. B. 48, under name of *Tradescantia discolor.*)

RHOMBOID. Approaching a rhomb in shape; quadrangular, with the lateral angles obtuse. A Rhomboid leaf is shown at Fig. 370.

FIG. 370. RHOMBOID LEAF.

RHOPALA. A synonym of **Roupala** (which *see*).

RHOPALOSTIGMA (of Schott). Included under **Staurostigma** (which *see*).

RHOPALOSTYLIS (from *rhopalon*, a club, and *stulos*, a pillar; alluding to the club-shaped spadix). ORD. *Palmæ*. A small genus (two species) of greenhouse, unarmed palms, with mediocre, annulate trunks, natives of New Zealand and Norfolk Island. Flowers mediocre, spirally disposed; spathes two, complete, oblong, complanate, the lower one two-winged; spadices short, spreading, on very short and thick peduncles, the branches somewhat flabellate, rather thick, and dense-flowered; bracts subulate at apex; bracteoles scale-like. Fruit small or rather large, ellipsoid, smooth. Leaves terminal, equally pinnatisect; segments equidistant, numerous, narrow-ensiform, acuminate, recurved, but not thickened at the margin and base; petioles very short; sheath elongated. For culture, *see* **Areca.**

FIG. 371. RHOPALOSTYLIS BAUERI.

R. Baueri (Bauer's).* *fl.*, spathes white, 8in. to 10in. long, 3in. to 4in. across, narrow-oblong, acuminate; spadix axillary, "but, owing to the falling away of the leaf as soon as the spathe is ready to open and the flowers are fully formed, only flowering when infraaxillary, horizontally spreading from the caudex, 1ft. to 2ft. long, sparingly branched" (Hooker). *l.* 6ft. to 9ft. long, pinnate, furfuraceous-scaly on the rachis, costa, and nerves; pinnules closely set, 2ft. long, 1½in. broad, stiff, acuminate, ribbed and plaited. Trunk 20ft. high and 4in. in diameter. Norfolk Island. See Fig. 371. (B. M. 5735, under name of *Areca Baueri*.)

R. sapida (savoury).* *fl.* pale pink, very numerous; spadix much-branched, dense-flowered, 1½ft. to 2ft. long, inclosed in a double, boat-shaped spathe. *l.* pinnate, 4ft. to 6ft. long; pinnules very narrow, linear-lanceolate, with replicate margins; nerves and costa, and especially the petioles, covered with minute, lepidote scales. Trunk 20ft. high, 6in. to 8in. in diameter. SYNS. *Areca sapida* (B. M. 5139), and *Kentia sapida* (of gardens).

RHOPALOSTYLIS (of Klotzsch). Now included under *Dalechampia*.

RHUACOPHILA. A synonym of *Dianella*.

RHUBARB (*Rheum*). Rhubarb is a well-known, hardy perennial, cultivated in nearly every garden. Its leaf-stalks are used, either in a blanched or natural state, in pies, tarts, &c.; they also form material for making an excellent preserve, and for Rhubarb wine. The latter is, however, considered a very unwholesome beverage, even injurious to many constitutions.

CULTIVATION. Plants may readily be raised from seeds, which should be sown in spring, on a gentle hot-bed, the seedlings being afterwards transferred, when large enough, to the open ground. The method of increase generally practised, and one by which strong plants can be obtained in a much shorter time, is that of dividing up the roots, so that a crown is reserved for each piece. When a new plantation is in course of formation, it should be attended to as early as possible in spring. The ground should be previously deeply trenched and manured, and single-crown divisions, or seedlings, may be planted about 3ft. apart each way, the crowns being kept slightly above the surface. Rhubarb succeeds best in a rich, rather light soil, and in a light, open situation; but it grows freely under fruit-trees, as instanced by the quantities obtained in spring from market gardens. None of the leaves or stalks should be pulled during the first season; this would unduly weaken the rootstock. The second year a fair supply will be obtainable, and a good crop the third. A Rhubarb plantation will last good for several years, if an annual top-dressing of manure be given during winter; but it is well to renew it after about four or

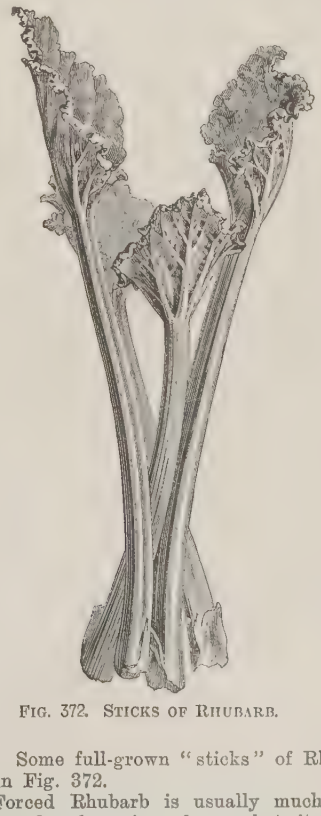


FIG. 372. STICKS OF RHUBARB.

five seasons. Some full-grown "sticks" of Rhubarb are represented in Fig. 372.

Forcing. Forced Rhubarb is usually much esteemed during winter and early spring; for market, it proves one of the most remunerative of crops. There are various methods adopted for procuring a supply, all of which are more or less successful. Where sufficient plants are at command, some may be lifted and placed in cellars,

Rhubarb—*continued.*

mushroom-houses, or any structure where there is a temperature of about 55deg. or 60deg.; if subjected to a strong heat before growth commences, the rootstocks are liable to decay. Plants about three years old are best for forcing, but, where such are not at command, older ones will do, though the crowns will most likely not start so readily, nor will the leaf-stalks be so strong. Forcing under glass, or in a mushroom-house, is by far the most satisfactory plan where it can be carried out; all that is necessary is to place the roots nearly close together, scatter a little soil amongst them and over the tops, and water occasionally. In the open ground, Rhubarb forcing may be conducted by placing large flower or seakale-pots, boxes, &c., over the roots where they have been growing, and burying them with a good depth of fermenting material, composed of stable litter and leaves. Forcing may commence indoors about November; a supply would not be readily obtained outside at that season, as the necessary heat could not be so steadily maintained.

SORTS. Of these, the following are amongst the best in cultivation:

CHAMPAGNE (Hawke's), early, deep red; an excellent variety for general culture, good in all respects. EARLY RED, one of the best early varieties, much grown in market gardens; the leaves are shining and somewhat glaucous. GOLIATH or MONARCH (Stott's), vigorous; leaf-stalks broad and very large. LINNÆUS (Myatt's), a good early sort of fine quality, excellent for forcing. PARAGON (Kershaw's), very distinct; stalks well formed and firm; early. SCARLET DEFIANCE (Baldry's), stalks crimson; leaves large; a good second early sort. VICTORIA (Myatt's), stalks very large and thick, of good quality; a well-known and excellent variety for summer use.

RHUS (from *Rhous*, the old Greek name of the genus used by Theophrastus). Sumach. Including *Lithræa*. ORD. *Anacardiaceæ*. A genus comprising about 120 species of stove, greenhouse, or hardy trees or shrubs, mostly possessing poisonous properties in a greater or lesser degree; they are found in the temperate regions of both hemispheres, being especially abundant at the Cape of Good Hope, but rarely occur within the tropics. Flowers small, polygamous, in axillary and terminal, bracteate panicles; calyx four to six-parted, persistent, the segments imbricated; petals four to six, equal, much spreading, imbricated; stamens four, five, six, or ten. Drupes small, dry, compressed. Leaves alternate, simple, one to three-foliolate, or impari-pinnate; leaflets entire or serrate. "Some American species, such as *R. venenata* and *R. Toxicodendron*, produce effects almost rivalling those once fabulously imputed to the Upas-tree of Java (*Antiaris*), the hands and arms, and sometimes even the whole body, becoming greatly swollen from simply touching or carrying a branch of one of these plants, and the swelling being accompanied with intolerable pain and inflammation, and ending in ulceration. These effects, however, are not felt by everyone, some people being able to handle the plants with impunity" (Lindley and Moore). *R. Coriaria* affords the sumach or shumac of commerce. From *R. Cotinus* the yellow dyewood called Young Fustic is obtained. A selection of introduced species (which are hardy, deciduous shrubs, except where stated otherwise) is given below. The greenhouse kinds will grow in any soil, and may be increased by ripened cuttings, inserted in sand, under a hand glass. The hardy species are very suitable for shrubberies. Some of them propagate freely by cuttings of the roots, and others by cuttings and layers.

R. aromatica (aromatic). *fl.* pale yellow, in clustered, scaly-bracted, catkin-like spikes, preceding the leaves. April and May. *l.* pubescent when young, thickish when old, sweet-scented when crushed; leaflets three, rhombic-ovate, unequally cut-toothed, the middle one wedge-shaped at base. *h.* 8ft. North America, 1773. SYN. *R. suaveolens.*

R. atomaria (undivided). A synonym of *R. villosa.*

R. caroliniana (Carolina). A synonym of *R. glabra.*

R. coccinea (red). A synonym of *R. glabra.*

Rhus—*continued.*

R. copallina (gum-copal). *fl.* greenish-yellow, in a terminal, thyrsoid panicle. July. *l.*, petioles wing-margined between the nine to twenty-one oblong or ovate-lanceolate, often entire leaflets, which are oblique or unequal at the base, smooth and shining above. Branches and stalks downy. *h.* 1ft. to 7ft. North America, 1688. Shrub with running roots.

R. Coriaria (hide-tanning). *fl.* whitish-green, in large, loose panicles. July and August. *l.* villous; leaflets eleven to fifteen, elliptic, with large, blunt teeth, becoming purplish-red in decay. *h.* 15ft. to 20ft. Portugal to Tauria, 1629. Shrub or low tree. (W. D. B. 135.)

R. Cotinus (Cotinus).* Smoke Plant. *fl.* pale purplish or flesh-colour, in loose panicles; pedicels becoming lengthened and hairy after flowering. June and July. *l.* obovate, undivided. *h.* 6ft. to 8ft. Spain to Caucasus, 1656. Shrub rambling. (J. F. A. 210.)

R. C. pendula (weeping). A form with pendulous branches.

R. diversiloba (variously-lobed). *l.* smaller than in *R. Toxicodendron*; leaflets ovate, very obtuse, obtusely lobed on the anterior margins. Branchlets short. *h.* 15ft. California. Erect tree. (B. R. 1845, 38.)

R. elegans (elegant). A synonym of *R. glabra.*

R. glabra (glabrous).* *fl.*, males greenish-yellow, females greenish-red, paniculate. June. *l.* glabrous; leaflets seventeen to twenty-one, lanceolate-oblong, serrate, whitish beneath. Branches glabrous. *h.* 5ft. to 18ft. North America, 1726. Shrub or low tree. (W. D. B. 15; T. S. M. 572.) SYNS. *R. caroliniana, R. coccinea, R. elegans* (W. D. B. 16), *R. sanguinea.*

FIG. 373. RHUS GLABRA LACINIATA.

R. g. laciniata (torn).* Fern-leaved Sumach. A very elegant variety, having leaves cut in a laciniate manner. See Fig. 373. (R. H. 1863, 7.)

R. javanica (Javan). A synonym of *R. semialata Osbeckii.*

R. lucida (clear). *fl.* white; panicles axillary and terminal, shorter, or a little longer, than the leaves. July. *l.* shortly petiolate; leaflets sessile, obovate, quite entire, very blunt, somewhat emarginate, quite smooth, glossy. *h.* 4ft. to 6ft. Cape of Good Hope, 1697. Greenhouse.

R. sanguinea (bloody). A synonym of *R. glabra.*

R. semialata Osbeckii (half-winged, Osbeck's).* *l.* large; leaflets fifteen to twenty-three, oval, toothed, whitish-woolly beneath. Bark smooth. *h.* 20ft. Japan, 1867. Greenhouse. (R. H. 1867, 111, under name of *R. Osbeckii.*)

R. suaveolens (sweet-smelling). A synonym of *R. aromatica.*

R. succedanea (substituting).* Red Lac Sumach. *fl.* greenish-yellow. June and July. *fr.* white, the size of a cherry, containing a smooth nut. *l.* smooth, permanent, on wingless petioles; leaflets eleven to fifteen, ovate-lanceolate, taper-pointed, shining, netted with veins, and glaucous beneath. *h.* 10ft. to 15ft. Japan, 1768. Greenhouse evergreen.

R. Toxicodendron (poison-tree).* Poison Ivy; Poison Oak. *fl.* greenish-yellow, in loose, slender, axillary panicles. June. *l.*, leaflets three, rhombic-ovate, mostly pointed, and rather downy beneath, variously notched, sinuated, or cut-lobed. North

Rhus—*continued.*

America, 1640. Shrub climbing by rootlets over rocks, &c., or ascending trees, poisonous to the touch. (A. F. B. ii. 556; T. S. M. 577.)

R. T. radicans (rooting). *l.* mostly entire or nearly so. Stems rooting, but not climbing. (B. M. 1806, under name of *R. T. vulgare*.)

R. typhina (fever).* Stag's-horn Sumach; Vinegar-tree. *fl.* greenish-yellow, in a terminal, thyrsoid panicle. June. *l.*, leaflets eleven to thirty-one, pale beneath, oblong-lanceolate, pointed, serrate, rarely laciniate. Branches and stalks densely-velvety hairy. *h.* 10ft. to 30ft. North America, 1629. Shrub or tree. (T. S. M. 571.) *R. viridiflora* (green-flowered) is a male-flowered form of this species.

R. t. arborescens (arborescent). *l.* slightly downy beneath. *h.* 10ft. to 25ft. Tree.

R. t. frutescens (shrubby). *l.* downy and whitish beneath. *h.* 2ft. to 10ft. Shrub.

R. venenata (poisonous). Poison Elder, Sumach, or Dogwood. *fl.* green, in loose and slender axillary panicles. July. *l.* rather glabrous than pubescent; leaflets seven to thirteen, obovate-oblong, entire. *h.* 6ft. to 18ft. North America, 1713. The most poisonous species of the genus. (T. S. M. 575; W. D. B. 19.) SYN. *R. vernix.*

R. vernicifera (varnish-bearing). Japan Lacquer or Varnish-tree. *fl.* greenish-yellow. June. *l.* long, resembling those of a Walnut; leaflets eleven or thirteen, elliptic, acute, quite entire, smoothish above, but velvety beneath from pubescence. Branchlets and stalks clothed with soft down. *h.* 30ft. Japan, 1823. Tree.

R. vernix (varnish). A synonym of *R. venenata.*

R. villosa (villous). *fl.* greenish-yellow; racemes axillary, much shorter than the leaves, the terminal ones paniculate, somewhat longer. July. *l.* petiolate; leaflets sessile, obovate, obtuse, mucronulate, entire, 1in. to 1½in. long, ½in. to 1in. wide, with revolute margins, hairy or villous on both surfaces, as well as the petioles and branchlets. Cape of Good Hope, 1714. Greenhouse evergreen shrub or tree. SYN. *R. atomaria.*

RHYNCHADENIA. A synonym of **Macradenia** (which *see*).

RHYNCHANTHERA (from *rhynchos*, a beak, and *anthera*, an anther; the anthers are beaked). ORD. *Melastomaceæ*. A genus of about two dozen species of glandular or pilose, often bristly, stove, annual or perennial herbs or shrubs, natives of Brazil, Guiana, New Grenada, and Peru. Flowers purple, panicled, often large, showy; calyx tube ovoid or campanulate; lobes five, subulate, lanceolate, or bristly, often persistent; petals obovate; stamens ten, very unequal. Leaves ovate, cordate, or oblong. The only species introduced—*R. grandiflora*—is a handsome, stove, evergreen shrub. It requires a compost of rich, sandy peat and fibry loam. Ample drainage is essential. Propagation may be effected by cuttings, inserted in sandy loam, in heat, and covered with a bell glass, which should be slightly raised, in order to permit free circulation, and, at the same time, to prevent damping off.

R. grandiflora (large-flowered). *fl.* numerous, terminal, shortly pedicellate; calyx tube purple, shorter than the narrow teeth, panicle dichotomously branched, corymbiform. Autumn. *l.* rather large and long-stalked, cordate-ovate, shortly acuminate, serrulated, seven to nine-nerved, slightly bristly. Branches subterete, hairy, or sometimes slightly hispid. *h.* 6ft. North Brazil, 1873. (B. M. 6011.)

RHYNCHITES. A genus of Weevils, noteworthy for the harm done by several of the species to trees. Some of them have the habit of rolling part of a leaf, or one or more leaves, into a cone, to supply protection and food to the larvæ. The cones hang in a withered state by the half-cut stalks or midribs of the leaves. Others gnaw partly through young shoots, or young fruit, and lay one or more eggs in each, and the larvæ feed in the withered branch or fruit. By the time the larva is full-fed, the part of the plant containing it has usually fallen off, and the larva crawls into the earth, there becomes a pupa, and, finally, the beetle emerges, generally in the following spring. The beetles are harmful also by gnawing the young leaves and branches of most kinds of trees, including fruit-trees, for their own food. They are all small, usually being from ⅛in. to ¼in. long. The general outline is broadly pear-

Rhynchites—*continued.*

shaped, the wing-cases being rather square in front, and broader than the thorax. The head bears a rather long, decurved beak, on the middle of which are the straight, clubbed antennæ. The beetles are all shining dark blue, green, brown, or coppery-red in colour. Reference has already been made to these insects as injurious to Pear-trees, Plum-trees, &c. The following are the most hurtful species:

R. Alliariæ is much like *R. conicus* in size and colour, but the thorax is finely pitted, and has a smooth dorsal line, and the elytra are not decidedly wider behind the middle. The larvæ live in the stalks and midribs of the leaves of many fruit-trees, *e.g.*, Apple, &c.

R. Bacchus is ¼in. to ⅓in. long, purple-red, with a golden-coppery gleam on the wing-cases and on the back of the neck; beak, legs, and antennæ are blue-black; wing-cases deeply punctured, and transversely wrinkled. This species prefers Apple and Pear trees, but is not restricted to them. The larvæ live in the still unripe fruits, which are hindered and interfered with in their growth.

R. betuleti is about ⅓in. long, or more, entirely blue or shining green, or a combination of these, and hairless; wing-cases closely punctate, irregularly striate, not wrinkled. The beetles live on many kinds of trees, but prefer, among those of gardens, Pear-trees and Vines. The females make conical habitations for the larvæ out of one or several leaves rolled together, and caused to wither by their stalks being partly gnawed through, as stated above.

R. conicus is from ⅛in. to ⅙in. long; colour deep blue, sometimes with a greenish tinge; beak and limbs black; thorax coarsely pitted; wing-cases deeply punctate-striate, broadest *behind* the middle. In May and June, the females lay eggs in the young shoots of Apples, Pears, Plums, Cherries, and other fruit-trees, and then gnaw the branches partly through below the situation of the eggs. The branches fade and hang down, and in this state form the proper food of the larvæ, which feed in the pith.

R. cupreus is about ⅕in. or ¼in. long, and is coppery or bronze-coloured, with a thin coat of greyish hairs; the beak and limbs are black; the thorax is closely punctured; the elytra are deeply punctate-striate, with the interspaces transversely wrinkled. The beetles live on all kinds of fruit-trees in early summer, and do considerable harm by gnawing the young shoots and buds; but they prefer Cherries and Plums. The females seek out the young fruits, and deposit an egg in a hole bored in each, after the stalk is gnawed half through, so that, after a time, the fruits fall to the earth. The larvæ feed in the fruits till ready to enter the soil, there to become pupæ.

A beetle of this genus, *R. bicolor*, injures Roses in the United States.

Remedies. These consist of the capture of the beetles by shaking the trees over trays tarred inside, and the removal of the conspicuously injured leaves, young branches, or fruits, to be burned as soon as convenient. Fortunately, the evil can be checked, in most cases, without serious labour.

RHYNCHOGLOSSUM (from *rhynchos*, a beak, and *glossa*, a tongue; the lower lip of the flower is in the form of a tongue-like beak). SYNS. *Antonia, Loxotis.* ORD. *Gesneraceæ*. A genus of one or two species of closely-related, erect, slightly-branched stove herbs, broadly dispersed over the East Indies and the Malayan Archipelago. Flowers blue, rather large, shortly pedicellate, pendulous; calyx broadly tubular-campanulate, shortly five-fid; corolla tube cylindrical, loosely incurved; limb bilabiate, the dorsal lobe shortly bifid, the anterior one much larger and trifid, the lateral ones shorter;

Rhynchoglossum—*continued.*

racemes terminal, or at length opposite the leaves, secund, loose. Leaves alternate, ample, membranous, very unequilateral. *R. zeylanicum* is a pretty annual, or at most biennial, requiring culture similar to **Klugia** (which *see*).

R. zeylanicum (Cingalese). *fl.* in long, terminal, sometimes interrupted, sometimes leafy, racemes; corolla blue, paler and almost white beneath, with a little yellow. July. *l.* alternate, petiolate, somewhat ovate, entire, closely penninerved. *h.* about 1ft. Ceylon, 1844. (B. M. 4198.)

RHYNCHOPETALUM. Included under **Lobelia** (which *see*).

RHYNCHOSIA (from *rhynchos*, a beak; alluding to the shape of the keel). ORD. *Leguminosæ*. A genus comprising about seventy-five species of stove or greenhouse, twining, prostrate, or rarely erect herbs, shrubs, or sub-shrubs, inhabiting warm regions. Flowers yellow, the standard often darkly lined, rarely purple, in axillary racemes, rarely solitary in the axils; two upper calyx lobes more or less connate; standard obovate or orbicular, spreading or reflexed; keel incurved at the apex. Leaves pinnately, or rarely sub-digitately, trifoliolate, exstipellate or minutely stipellate; leaflets resinous-dotted beneath The species are of no great beauty; only four call for mention here. They thrive in a light, sandy soil, and may be propagated by seeds.

R. Chrysoscias (Chrysoscias). *fl.* golden-yellow, or orange; standard ample; peduncles three or four-flowered at the summit. May. *l.* on very short petioles; leaflets 1½in. long, oblong-lanceolate, with revolute margins, dark-coloured above, fulvescent beneath. South Africa, 1871. Climbing, greenhouse sub-shrub, covered on the younger portions with gold or tawny hairs. (B. M. 5913.)

R. cyanosperma (blue-seeded). *fl.*, corolla bright red-purple, equalling the calyx. Summer. *l.*, leaflets three, leathery; central one roundish, 4in. to 5in. long, cuspidate, with a petiolule ½in. long; lateral ones unequal-sided; upper surface thinly, lower densely, grey-pubescent. Tall, shrubby climber. Tropics.

R. c. albiflora (white-flowered). *fl.* yellowish-white. April. *l.* acuminate, with a very long acumen. Climbing, stove sub-shrub. (B. M. 1859, under name of *Cylista albiflora*.)

R. gibba (tumid). *fl.*, standard ovate, streaked with brown; peduncles 3in. to 4in. long, floriferous above the middle. September and October. *l.* on rather long petioles; leaflets variable, sometimes almost orbicular and very obtuse, sometimes rhomboid, acuminate, the lateral ones very unequal-sided, ½in. to 1½in. long and broad. Stems climbing or trailing, densely pubescent. South Africa. Greenhouse shrub. (B. R. 275, under name of *Glycine caribæa*.)

R. phaseoloides (Phaseolus-like). *fl.*, standard striped with purple; racemes many-flowered. June and July. *l.*, leaflets ovate or ovate-rhomboid, pointed. Stem suffruticose, twining, sub-cylindrical. West Indies, 1818. Stove. (B. M. 2284, under name of *Glycine phaseoloides*.)

RHYNCHOSPERMUM (of Lindley). A synonym of **Trachelospermum** (which *see*).

RHYNCHOSTYLIS (from *rhynchos*, a beak, and *stulos*, a pillar; alluding to the shape of the column). ORD. *Orchideæ*. A small genus (two or three species) of stove, epiphytal orchids, natives of the East Indies and the Malayan Archipelago. Flowers rather large or mediocre, shortly pedicellate; lateral sepals broader than the dorsal one; lip affixed to the column, profoundly saccate at base, with obsolete, lateral lobes; column short, thick; racemes lateral, long, dense-flowered. Leaves distichous, coriaceous or fleshy, flat; sheaths persistent, concealing the stem. For culture of *R. retusa*, the best-known species, *see* **Saccolabium.**

R. retusa (retuse).* *fl.* white, striped with violet-pink; petals half as wide as the ovate sepals; lip one-coloured, with a compressed, truncate-conical spur, the lamina lanceolate, inflexed, slightly costate at back; racemes cylindrical, dense. *l.* 1ft. long, channelled, unequally truncate. East Indies, 1820. A pretty species. SYNS. *Saccolabium Blumei* (L. S. O. 47), *S. guttatum* (B. M. 4108), *Sarcanthus guttatus* (B. R. 1443).

RHYNCHOTECHUM (name not explained by its author). SYNS. *Cheilosandra, Chiliandra, Corysanthera*. ORD. *Gesneraceæ*. A genus comprising about half-a-dozen

Rhynchotechum—*continued.*

species of villous, hairy, or woolly, stove sub-shrubs, natives of the East Indies and the Malayan Archipelago. Flowers pink or white, small; calyx of five narrow segments; corolla with a short, broadly campanulate tube, and a sub-bilabiate limb; cymes pedunculate in the axils or defoliated nodes, often bundle-flowered, densely or loosely trichotomous. Leaves ample, opposite or rarely ternately whorled. Only one species has yet been introduced. For culture, *see* **Gesnera.**

R. ellipticum (elliptic-leaved). *fl.* of a deep rose-colour, small, disposed in crowded, axillary corymbs. Summer. *l.* opposite, obovate-elliptic. Stem simple, erect, 2ft. to 3ft. high. Assam and Sikkim, 1870. (B. M. 5832.)

RHYNCOPERA. Included under *Pleurothallis*.

RHYSOSPERMUM. A synonym of **Notelæa** (which *see*).

RHYTIDANDRA. A synonym of **Marlea** (which *see*).

RHYTIDOPHYLLUM (from *rhytis, rhytidos*, a wrinkle, and *phyllon*, a leaf; alluding to the rugose leaves). ORD. *Gesneraceæ*. A genus comprising about ten species of villous or white-woolly, rarely almost glabrous, stove shrubs or small trees, natives of the West Indies and Columbia. Flowers often softly villous or woolly; calyx tube adnate, turbinate, or nearly hemispherical; corolla usually greenish outside, variously coloured within; tube incurved, enlarged above; limb of short, broad, erecto-patent lobes; peduncles axillary, elongated, cymosely many-flowered. Leaves alternate, shortly petiolate, often elongated, entire or crenate, softly rugose or scabrous, sometimes very scabrous and woolly beneath. Only two species have been introduced. For culture, *see* **Gesnera.**

R. auriculatum (eared). *fl.* greenish, red-spotted within; corolla sub-campanulate, hairy; peduncles almost equalling the leaves, glandular-tomentose. August. *l.* sessile, narrowed at base and auriculate, dilated and semi-amplexicaul, serrated, tomentose-scabrous above, slightly hoary beneath. *h.* 1ft. Brazil, 1824. (B. M. 3562.)

R. tomentosum (tomentose). *fl.*, corolla greenish-yellow, variegated with purple spots, or purple, ⅔in. long, scabrous-tomentose; peduncles equalling or exceeding the leaves. Summer. *l.* lanceolate or oblong-lanceolate, 4in. to 8in. long, acuminate, serrate, scabrous above, villous beneath. *h.* 2ft. to 3ft. West Indies. (B. M. 1023, under name of *Gesneria tomentosa*).

RHYTIGLOSSA. A synonym of *Dianthera*.

RHYTISMA. A genus of Fungi which make their appearance upon the leaves and branches of Maples, certain Willows, and a few other plants, in the form of shining, deep black patches, rising a little above the general level of the part bearing them. The most generally known species is that which gives rise to the large black spots so common in autumn upon the leaves of *Acer campestre*, or Field Maple, and of *Acer Pseudo-platanus*, the Sycamore of England, the Plane of Scotland. These spots, in their common form, are often ½in. or more in breadth, and are of a uniform tint. The Fungus is known as *R. acerinum*. A variety called *R. punctatum* differs from this in having the spots broken up into a number of small black specks instead of a uniform black patch. In autumn, there is no sign of reproductive organs on the Fungus; but if a patch is examined in spring, after the leaf has lain on the moist ground all winter, there are found imbedded in the mass numerous asci, each inclosing eight slender spores.

The remedy is easy, and consists in the careful removal of the diseased leaves, as is done in well-kept gardens and pleasure-grounds. In such places, this disease is of rare occurrence compared with its abundance in most other localities. Its presence renders the leaves unsightly, but is not dangerous to them.

RIB. A primary and strong vein, or conspicuous portion of the framework, of a leaf.

RIBBON GRASS. *See* **Phalaris arundinacea variegata.**

RIBBON-TREE. *See* **Plagianthus.**

RIBES (an Arabic name, properly belonging to a species of *Rheum; Grossularia* was, according to Dr. Asa Gray, the proper name to have been adopted for the genus). Currant; Gooseberry. Including *Calobotrya, Chrysobotrya,* and *Grossularia.* ORD. *Saxifrageæ.* A genus comprising about fifty-six species of hardy, deciduous shrubs, often resinous-glandular, unarmed, or with spines beneath the axils or scattered; they are natives of Europe, temperate Asia and America, and the Andes of South America. Flowers white, yellow, red, or green, rarely purple, often unisexual by abortion, racemose or sub-solitary; calyx tube ovoid or spherical, adnate to the ovary; limb tubular or campanulate, four or five-fid, often coloured, the lobes erect or incurved, imbricated or sub-valvate; petals four or five, inserted at the throat of the calyx, small, scale like, usually included; stamens four or five, inserted with the petals; pedicels bracteate at base and bibracteolate in the middle. Berries oblong or globose, pulpy, crowned by the calyx, one-celled, many-seeded. Leaves scattered, often fascicled, petiolate, simple, entire or often lobed, crenate, or cut, plicate or convolute in vernation; stipules adnate to the petioles or wanting. A great many of the plants have been introduced; those best known in garden are described below. Four species are included in the British Flora. Spring is the flowering period. There is but little difficulty in propagating and growing any of the species. They root readily from cuttings or layers, and succeed in almost any ordinary garden soil. *See also* **Currant** and **Gooseberry.**

FUNGI. These are not, on the whole, very destructive to the shrubs of this genus. The dead roots and stems provide suitable food for *Nectria Ribis,* and for other *Pyrenomycetes*; but these need not be discussed here. The living leaves of Gooseberries frequently, and of Currants occasionally, show orange or reddish, swollen spots, on which are numerous little pits or cups, filled with the small spores of *Æcidium Grossulariæ.* This Fungus also attacks the fruits, and may do a good deal of harm, but is not usually very injurious. The diseased leaves and fruits should be picked off as soon as the orange spots are observed. Less often, the leaves bear small, dark brown masses, which, on examination with the microscope, are found to be made up of brown spores, each consisting of two cells, and borne on a pale stalk attached to one end of the spore. This Fungus is named *Puccinia Ribis.* Another Fungus is common and destructive to the leaves of species of *Ribes* on the Continent of Europe. It appears in the form of yellow, raised spots on the lower surface of the leaves, often so numerous as almost to overspread them, and, in time, to destroy them. These spots are covered with the round, one-celled spores of *Cæoma Ribesii.*

The leaves of Gooseberries and of Currants are often marked with discoloured spots, which become dry and withered. In these are generally to be seen minute, black spots, which, under the microscope, are found to be pycnidia with minute sporidia. Those on Currants belong to forms known by the names of *Glœosporium Ribis* and *Septoria Ribis,* and those on Gooseberries have received the name of *Septoria Grossulariæ.* They are all, probably, young stages of true *Pyrenomycetes,* of which one, *Sphærella Ribis,* has been recorded from similar spots. These Fungi seldom do serious injury. The most successful treatment is to pick off and burn the leaves that show the spots, and the same holds good of the *Puccinia* and the *Cæoma* mentioned above. The leaves of Gooseberries are frequently covered with a thin, white coating, which, after a time, becomes studded with small, black grains, like gunpowder. This

Ribes—*continued.*

is due to the growth of a **Mildew** (which *see*), known as *Microsphæra Grossulariæ.* The white coat is composed of the mycelium and conidia (*see* **Oidium**). The black specks are perithecia, which bear ten to fifteen transparent outgrowths, bifurcated about three times. Each perithecium incloses from four to eight asci, which contain four or five spores. Flowers of sulphur and solution of potassium sulphide, employed as advised under **Oidium,** are the best remedies, should any be needed.

INSECTS, &c. The animals most injurious to plants of this genus have been briefly treated of under the headings **Currant** and **Gooseberry**; and several of them have received somewhat fuller notice under the headings mentioned below. The young twigs of Currants are often bored into and killed by the larvæ of the **Currant Clearwing Moth** (which *see*). The infested branches may be detected by the drooping of the leaves, and should be cut off, with the larvæ in them, and burned.

FIG. 374. GOOSEBERRY AND CURRANT SAWFLY (*Nematus Ribesii*)—*a,* Lines to show actual spread of wings and length of body.

The buds of Black Currants (*R. nigrum*) are, in some localities, tenanted by Mites (*Phytoptus Ribis*), which cause them to enlarge, but destroy the shoots; and the bushes are thus rendered useless, and may be killed. The swollen buds should be removed, and destroyed; and, if the attack is severe, the bushes should be uprooted, and burned, and others should not be planted in the same soil for two or three years (*see* **Mites**).

The leaves of Gooseberries, and of Currants of several kinds, suffer very seriously from the attacks of the larvæ of the **Gooseberry or Magpie Moth** (which *see*); and, to a less degree, from those of the V-Moth (*Halia* or *Phalæna Wavaria*). The appearance of the former, and the remedies against the larvæ, are specified under the heading quoted above. The V-Moth also belongs to the Geometers, and resembles the Magpie Moth in form; but the spread of wings does not exceed 1¼in., and the colour is grey, with a purplish gloss, and brownish hind margins to the wings. Along the front margin, each fore wing bears numerous short streaks, and four spots of dark brown. The second spot joins with a dark spot in the centre of the wing, so as to form a V (hence the popular name of the moth), with its tip directed from the body. The moth appears in July; the larvæ are most conspicuous about May. They are cylindrical, with slight dilatations along the sides. The head is lead-coloured, with dark markings; and the body varies from dull green to lead-colour, but always shows wavy, smoke-coloured lines lengthwise, and a row of pale yellow spots along each side; in each

Ribes—*continued.*

spot are three black warts, each bearing a black bristle. The pupa is suspended in a slight web among the leaves on the bushes. The same remedies may be used against these insects as against the Magpie Moth.

Sawflies are frequently most hurtful to Gooseberries, and to Red and White Currants. (*See* **Gooseberry and Currant Sawfly** for a short account of *Nematus Ribesii*, the most hurtful species. But the account there given is so incomplete, that we supplement it here, in view of the very great damage often done by the larvæ to Gooseberry and Currant-bushes, which, at times, they completely strip of their leaves.) The insects (see Fig. 374) are clay-yellow, with three large, black marks on the back of the thorax, one on the breast, and others on the sides. The legs are pale, except dark tips to the last pair; the antennæ are dark. The wings are hyaline, with a black stigma. The body is ¼in. or ⅓in. long. The insects vary in the amount of black upon them, occasionally having even the abdomen almost black. The eggs are laid on the veins of the lower surface of the leaf, in which the young larvæ eat little holes at first; but, after a time, they devour the whole leaf, except the chief veins. The larvæ, till their last moult, are mostly green, studded with numerous black, shining

FIG. 375. LARVA OF GOOSEBERRY AND CURRANT SAWFLY (*Nematus Ribesii*).

tubercles, bearing hairs (see Fig. 375). The first and second, and the eleventh to thirteenth, segments are orange. The true legs are mostly black, and the claspers are pale green. In the last moult, the tubercles are thrown off, and the larvæ become uniform bluish-green, with an orange spot behind the head, and another on the tail. When full-fed, the larvæ drop to the ground, and an inch or two below the surface spin brown cocoons. Inside these may be found the pupæ, green or yellowish-green, with orange markings on the thorax and tip of the abdomen. There are usually two generations in the year.

Nematus appendiculatus is less often markedly injurious to Gooseberry and Currant-bushes; for, though widely diffused throughout Britain, it is not very common. This Sawfly is readily distinguished from *N. Ribesii* by its black abdomen, as well as by its more truncate front wings, rather smaller size, and other minor peculiarities. The larva is green, with a yellowish tint on the second and eleventh and anal segments, and on the posterior legs. The larvæ go below ground to pupate.

Nematus consobrinus also feeds, in the larval state, on the leaves of Gooseberries, and is not rare in Britain. It much resembles *N. Ribesii*, but is slightly smaller and duller-coloured, though it varies a good deal in the latter respect. The larva is green, beset with black tubercles, each bearing a hair; the second segment, the sides over the legs, and part of the last segment, are yellow. At the last moult, the body becomes uniform bright green, except that behind the head and on the

Ribes—*continued.*

last segment yellow is visible. There is only one generation annually in Britain.

Remedies are specified under the heading already quoted, and need not be repeated here. They are applicable to all three species of Sawflies, and are, indeed, useful against all the insects that feed exposed on the leaves.

Several species of Greenflies, or **Aphides** (which *see*), live on the lower surface of the leaves of Gooseberries and Currants, and frequently distort the young leaves at the tips of the branches, causing these, on the Currants especially, to become swollen and reddened. Besides the injury thus done to the plants, the fruit suffers from being covered with the sticky excretions of the insects, and with the dust and soot that adhere to these, and the Fungi that find suitable food in them. In Buckton's "British Aphides," the following are recorded as especially injurious, viz., *Myzus Ribis* (see Fig. 376) with cylindrical honey-tubes, and *Rhopalosiphum Ribis* with the honey-tubes widened in the middle. Both species are green, with dark markings. For remedies against these insects, *see* **Aphides.** The tips of the twigs bearing distorted leaves should be cut off and destroyed by fire, if practicable. Syringing the bushes with water afterwards is beneficial, by cleaning the leaves and fruits.

FIG. 376. APHIS (MYZUS) RIBIS.

The figure on the leaf shows the Wingless Female rather larger than natural size; the lower figure shows the Winged Female much enlarged.

On the Continent of Europe, of late years, a good deal of injury has been done by a Gall-midge, the larvæ of which feed in the flower buds, and destroy them. The insects have not yet been reared. This foe has not been recorded in Britain.

The fruits are sometimes injured by the larvæ of *Halia Wavaria* (*see* above); but the worst foes to them are birds, *e.g.*, blackbirds and thrushes. The loss from this cause is easily prevented by netting bushes of any choice varieties; but probably the plants benefit as much as they lose when left unnetted, inasmuch as it has been observed that bushes under nets are more liable than others to be injured by insects. It must be remembered, also, that the birds most apt to carry off the fruits of Gooseberries and Currants well repay such plundering by their services in destroying noxious insects, snails, and other marauders during the year, besides the pleasure derived from their song.

R. alpinum (alpine). Tasteless Mountain Currant. *fl.* yellowish; racemes erect, glandular-pubescent; males 2in. to 2½in. long, twenty to thirty-flowered; females shorter, eight to ten-flowered. *fr.* scarlet, ⅓in. in diameter, insipid. *l.* 1½in to 2in. in diameter, broadly ovate, three to five-lobed; lobes usually three, acute, cut, and serrate, hairy. *h.* 3ft. Europe (Britain), &c. Unarmed shrub. (Sy. En. B. 519.)

R. a. japonicum (Japanese). *fl.* greenish, small, glomerulate *fr.* cherry-red. *l.* persistent, three-lobed, denticulate-crenate, strongly nerved. Branches divaricate. *h.* 3ft. Japan, 1877.

R. a. aureum (golden-leaved). A very dwarf, garden strain, with yellow flowers, well adapted for rockeries, &c. 1881.

Ribes—*continued.*

R. aureum (golden-flowered).* Buffalo Currant. *fl.* golden-yellow; petals much shorter than the calyx segments; racemes many-flowered. April and May. *fr.* yellow, seldom black, glabrous, of exquisite flavour. *l.* three-lobed; lobes divaricate, with a few deep teeth, shorter than the petioles, which are ciliated at the base. *h.* 6ft. to 8ft. North-west America, 1812. Glabrous, unarmed shrub. (B. R. 125.)

FIG. 377. FRUITING BRANCH OF RIBES GROSSULARIA.

R. a. præcox (early-flowering). *fl.*, racemes bracteate. *fr.* smaller, copious, turbinate. *l.* cuneate at base, pubescent beneath. The flowers and fruit appear earlier than in the type. (L. B. C. 1533, under name of *R. fragrans.*)

Ribes—*continued.*

with a mealy bloom; lobes bluntly toothed at the apex. *h.* 6ft. to 8ft. North America, 1812. (B. R. 1274.) In the form *fructu-nigro*, the berries change from yellow to red, and finally become deep blackish-purple; in *fructu-luteo*, they are always yellow.

R. Beatonii (Beaton's). A synonym of *R. Gordonianum.*

R. cereum (waxy). *fl.* white, three to five in a pendulous, pubescent raceme as long as the leaves; calyx segments reflexed. *fr.* red, glabrous. *l.* nearly round, obtusely trilobed, crenate, viscid. *h.* 3ft. North America, 1827. Unarmed shrub. (B. M. 3008; B. R. 1263; B. R. 1471, under name of *R. inebrians.*)

R. Cynosbati (Dog-Bramble). *fl.* green, two or three to a slender peduncle. *fr.* large, armed with long prickles like a burr, or rarely smooth. *l.* on slender petioles, slightly cordate, roundish, three to five-lobed, pubescent, 1in. to 2in. in diameter. *h.* 4ft. Stems spiny and commonly bristly. North America, 1759.

R. divaricatum (spreading-branched). *fl.* white, three on a drooping peduncle; calyx funnel-shaped. *fr.* black, smooth, spherical, of an agreeable flavour. *l.* roundish, three-lobed, deeply toothed, nerved, glabrous. Branches divaricate, bristly, at length naked; spines one to three together, axillary. *h.* 5ft. to 7ft. North America, 1826. (B. R. 1359.)

R. floridum (flowery).* American Wild Black Currant. *fl.* whitish, large; calyx tubular-campanulate, smooth; racemes drooping, downy. *fr.* black, smooth, round-ovoid, resembling the common Black Currant in smell and flavour. *l.* sprinkled with resinous dots, slightly heart-shaped, sharply three to five-lobed, doubly serrate. *h.* 4ft. North America, 1729. Unarmed shrub. SYNS. *R. missouriense* (of gardens), *R. pennsylvanicum.* The decaying foliage assumes a bright purplish-bronze colour in autumn, and the plant is then highly ornamental.

R. Gordonianum (Gordon's). A hybrid between *R. aureum* and *R. sanguineum*, intermediate between the two in all its characters. (F. d. S. 165.) SYNS. *R. Beatonii, R. Loudonii.*

R. gracile (slender).* *fl.* white, pendulous, about two together on peduncles; sepals reflexed; stamens very prominent. *fr.* deep rich purple, about ⅜in. in diameter, having a rich sub-acid, vinous, rather perfumed flavour. *l.* glabrous, roundish, entire at base, having in the outward part three crenately cut, blunt lobes. Branches prickly; prickles one, two, or three together. *h.* 4ft. to 5ft. North America, 1826. SYN. *R. niveum* (B. R. 1692).

FIG. 378. FRUITING BRANCH OF RIBES OXYACANTHOIDES.

R. a. serotinum (late-flowering). *fl.*, racemes naked, produced later than in the type. *fr.*, berries few, round. *l.* variable; lobes deeply serrate.

R. a. tenuiflorum (slender-flowered). *fl.* yellow. *fr.* purple or yellow, glabrous. *l.* roundish, three-lobed, covered, when young,

R. Grossularia (Grossularia).* Cat Berry; Wild Gooseberry. *fl.* greenish, drooping, ½in. in diameter; calyx lobes purplish, reflexed; peduncles one to three-flowered, short-pubescent, one to three-bracteate about the middle. *fr.* ½in. to 1in. in diameter. *l.* orbicular, glandular-hairy, three to five-lobed, 1in. to 2in. in

Ribes—*continued.*

diameter, fascicled on short, lateral branches, shining above; lobes irregularly crenate. Europe (Britain), &c. A small, spreading shrub, with one to three spines under the leaf-buds. See Fig. 377. (Sy. En. B. 518.) In the form *Uva crispa* (formerly regarded as a species), the ripe fruit is glabrous, and the leaves are smaller. There are many other varieties. For culture, &c., *see* **Gooseberry.**

R. hirtellum (slightly hairy). A synonym of *R. oxyacanthoides.*

FIG. 379. FLOWERING BRANCH OF RIBES SANGUINEUM.

R. lacustre (lake-loving).* *fl.* greenish-yellow; calyx broad and flat; racemes four to nine-flowered, slender, nodding. *fr.* bristly, small, unpleasant to the taste. *l.* heart-shaped, three to five-parted, with the lobes deeply cut. Young stems clothed with bristly prickles and weak thorns. *h.* 4ft. North America (in cold woods and swamps), 1812. (B. M. 6492.)

R. Lobbii (Lobb's). *fl.* drooping, two or three to a peduncle, large; calyx dark purple; limb of five segments, marked with lines of hairs; petals erect, almost white. April and May. *l.* small, cordate, three to five-lobed, glabrous above, downy beneath, sometimes glandular; petioles hairy. Branches harsh, rigid, beset with stipulary, spreading spines in threes or fours. *h.* 6ft. California. (B. M. 4931, under name of *R. subvestitum.*)

R. Loudonii (Loudon's). A synonym of *R. Gordonianum.*

R. missouriense (Missouri). A garden synonym of *R. floridum.*

R. multiflorum (many-flowered). *fl.* greenish-yellow, in very long, pendulous, drooping racemes. *fr.* red, small, and seldom produced. *l.* five-lobed, large, cordate, tomentose beneath. Branches vigorous, spreading, unarmed. *h.* 4ft. to 6ft. Eastern Europe, 1822. (B. M. 2368.)

R. nigrum (black).* Black Currant; Quinsy Berry. *fl.* green, ¼in. to ½in. in diameter; calyx campanulate, glandular; pedicels long; racemes drooping, loose-flowered, tomentose, eglandular. *fr.* black, ⅜in. in diameter, globose. *l.* 2in. to 3in. in diameter, five- to seven-lobed, similar to those of *R. rubrum*, but rather deeply lobed; petioles slender, pubescent. *h.* 5ft. Europe (Britain, but probably a garden escape). Unarmed shrub, emitting a strong odour when bruised. For culture, &c., *see* **Currant.**

R. niveum (snowy). A synonym of *R. gracile.*

R. oxyacanthoides (Hawthorn-like).* *fl.* greenish, one or more on a short peduncle. *fr.* red and green, or purplish-blue, small, of an agreeable flavour. *l.* glabrous, plaited; lobes toothed; petioles villous and a little hispid. Infra-axillary prickles larger and mostly solitary; smaller prickles scattered here and there. *h.* 2ft. to 3ft. North America, 1705. See Fig. 378. SYN. *R. hirtellum.*

R. pennsylvanicum (Pennsylvanian). A synonym of *R. floridum.*

R. punctatum (dotted). *fl.* yellowish-green; racemes pedunculate, pendulous, at first ovate, becoming oblong and looser. *fr.* small, glabrous. *l.* trilobed, serrated, shining yellowish-green, dotted beneath; petioles pubescent and ciliated. *h.* 3ft. Chili, 1826. A compact, shining, resinous shrub. (B. R. 1658.)

R. Roezlii (Roezl's). *fl.* solitary or in pairs, pendulous; calyx lobes red, lanceolate, revolute; petals white, linear-truncate, not spreading. *l.* roundish, sub-cordate, lobed. Branches armed at the nodes with trifid spines. *h.* 3ft. North-west America, 1879. (R. G. 982, Figs. 1-3.)

R. rubrum (red).* Wild Currant; Garnet Berry. *fl.* green, ¼in. in diameter; racemes 1in. to 3in. long, many-flowered, pubescent or glabrous, never glandular; bracts ovate. *fr.* red, acid, ¼in. in diameter. *l.* 2in. to 4in. in diameter, three to five-angled and lobed, cordate at base, glabrous or pubescent above, usually tomentose beneath; lobes triangular, crenate; petioles pubescent or bristly. *h.* 4ft. Europe (Britain), &c. Unarmed shrub. For culture, &c., *see* **Currant.**

R. r. album (white). A form with white berries.

Ribes—*continued.*

R. r. hortense (garden). *fr.* sweeter and larger than in *R. r. sylvestre.* *l.* large, sometimes variegated.

R. r. sativum (cultivated). *fl.* in glabrous, always drooping racemes. *fr.* globose. *l.* glabrous on both surfaces when mature. An escape from cultivation. (Sy. En. B. 520.)

R. r. spicatum (spiked). *fr.* contracted at the top. *l.* hairy above when young, and tomentose beneath. (Sy. En. B. 522.)

R. r. sylvestre (wood). *fl.* purplish; racemes pubescent, usually sub-erect when in flower, and drooping when fruiting. *fr.* contracted at the top. *l.* hairy above, tomentose beneath.

R. sanguineum (bloody-flowered).* Flowering Currant. *fl.* deep rose-colour; racemes drooping, pubescent, twice the length of the leaves. *fr.* purplish, with a glaucous bloom. *l.* cordate, somewhat five-lobed, serrated, veiny, smoothish above, clothed with villous tomentum beneath. *h.* 4ft. to 8ft. North-west America, 1826. Unarmed shrub. See Fig. 379. (B. M. 3335; B. R. 1349; L. B. C. 1487; S. B. F. G. ser. ii. 109; T. H. S. vii., p. 508.)

R. s. atro-rubens (dark-reddish). *fl.* much deeper and darker red, smaller, and in smaller racemes, than in the type.

R. s. glutinosum (glutinous). *fl.* very pale rose-colour; racemes rather larger than in the species. *l.* destitute of down, slightly viscous.

R. s. malvaceum (Mallow-like). *fl.* rather darker than in *R. s. glutinosum*, and having more of a lilac tinge, almost sessile; racemes short and close. *l.* rough and hispid on the upper side, clothed beneath with whitish, cottony down. (S. B. F. G. ser. ii. 340, under name of *R. malvaceum.*)

R. setosum (bristly). *fl.* white, tubular, in pairs. May. *fr.*, berries black, spherical, hispid, with a pleasant, sub-acid, somewhat musky flavour. *l.* nearly round, cordate at base, pubescent, three to five-lobed. Branches densely bristly; prickles unequal, subulate. 1810. (B. R. 1237.)

R. speciosum (showy).* Fuchsia-flowered Gooseberry. *fl.* deep red, four-parted; calyx cylindrical; pedicels glandular-hairy; stamens twice as long as the calyx; peduncles longer than the leaves, one to three-flowered. *fr.* red. *l.* wedge-shaped at base, rounded at the outer end, indistinctly three-lobed, incisely crenate, glabrous and nerved; petioles short. Branches hispid. Prickles infra-axillary, triple. *h.*, in a wild state, 3ft. to 4ft.; twice as much in cultivation. California, 1829. (B. 38; B. M. 3530; B. R. 1557; S. B. F. G. ser. ii. 149.)

RIBESIEÆ. A tribe of *Saxifrageæ.*

RIB GRASS. The common name for *Plantago lanceolata.*

RICE. *See* **Oryza.**

RICE FLOWER. *See* **Pimelea.**

RICE PAPER PLANT, CHINESE. A common name for *Fatsia papyrifera.*

RICE PAPER PLANT, MALAY. *See* **Scævola Kœnigii.**

RICHARDIA (named in honour of L. C. Richard, 1754-1821, an eminent French botanist). SYN. *Zantedeschia* (in part). ORD. *Aroideæ* (*Araceæ*). A genus comprising five species of greenhouse or nearly hardy, marsh-loving, South African, perennial herbs, with thick rhizomes, four of which have been introduced to this country. Flowers monœcious, all perfect; spathe white or yellowish, erect; tube short, convolute, funnel-shaped, accrescent, persistent; throat opening; blade obliquely explanate, marcescent, with a cuspidate, recurved apex; spadix shorter than the spathe, sub-stipitate, erect, cylindrical; inflorescence dense-flowered; peduncles usually several, elongated. Leaves sagittate, sometimes with white, translucid, fenestrate dots; petioles elongated, thick, sheathed at base. Richardias are very distinct and attractive subjects, both on account of their handsome foliage and tall-growing, elegant flower spathes. They are easily cultivated, and the spathes, particularly those of the well-known *R. africana*, are greatly favoured for cutting purposes. In a greenhouse, few things are more attractive than a group of these plants in flower. Propagation is easily effected from suckers, which are produced in quantity. They may be taken at any time, when the old plants are being repotted; spring is, perhaps, the best season, as young suckers will then have time to

Richardia—*continued.*

establish themselves, so as to flower early the following season. Richardias require a very rich soil; a compost of good loam and cow-manure in nearly equal parts will suit them when established. The suckers should be inserted singly in pots proportionate to their size, and subjected to a little heat to start them. When under glass through the summer, they should be placed in a situation fully exposed to light, and about the end of July it is well to transfer them to the open air, in order to get the growth matured and well ripened—an essential towards free-flowering. Before the appearance of frost, the plants must be again housed; exposure to anything below freezing point proves very destructive to the foliage. An excellent plan of treating Richardias, when established, is that of planting them out each year in the open garden; a piece of ground should be prepared by adding a heavy dressing of manure, and the plants should then be turned out of their pots, and divided, or kept intact, according to their size and the quantity required. If planted about 15in. apart, but little attention will be necessary through summer, beyond supplying an abundance of water, which Richardias require at all times. About the middle of September, the plants may be lifted and potted carefully without much injury being caused. In this way, good, strong specimens may soon be obtained; they may be grown singly in 5in. or 6in. pots, or two or three together in a pot of larger size. Aphides are usually troublesome in spring, but an occasional fumigation will destroy them.

R. æthiopica (African). A synonym of *R. africana.*

FIG. 380. RICHARDIA AFRICANA.

R. africana (African).* Lily of the Nile; White Arum or Trumpet Lily. *fl.*, spathe usually dead-white, large, rolled round below, but flattened and bent backwards above; spadix bright yellow, completely covered with flowers. Spring and summer. *l.* sagittate, about half as broad as they are long, deep green, unspotted, cuspidate-apiculate at apex, borne on long petioles. *h.* 2ft. 1731. A very elegant and popular plant. See Fig. 380. SYNS. *R. æthiopica, Calla æthiopica* (B. M. 832).

Richardia—*continued.*

R. albo-maculata (white-spotted).* *fl.*, spathe greenish-white, smaller and less expanded than in *R. africana.* Summer. *l.* elongate-hastate, borne on rather short petioles, cuspidate-apiculate at apex, marked with oblong, white, translucent blotches parallel with the nervation. *h.* 2ft. 1859. (B. M. 5140; F. d. S. 2258; I. H. 255; R. G. 462.)

R. hastata (halbert-leaved). *fl.*, spathe greenish-yellow, with a campanulate tube, and a long-cuspidate blade. Summer. *l.* subflaccid, hastate-ovate, about half as broad as they are long, cuspidate-apiculate at apex, unspotted, very similar to those of *R. africana.* *h.* 2ft. 1859. (B. M. 5176.)

R. melanoleuca (black and white).* *fl.*, spathe pale yellow, with a black-purple spot at the base, oblong, widely expanded, terminating the tall, hispid stems; spadix white, one-third shorter than the spathe; peduncle slender, dark bristly below. Summer. *l.* oblong or ovate, sagittate-hastate, marked with oblong, translucent, white spots. *h.* 1½ft. 1869. (B. M. 5765.)

RICHARDIA (of Linnæus). A synonym of **Richardsonia** (which *see*).

RICHARDSONIA (named in honour of Richard Richardson, an English botanist, who published a work on horticulture, in 1699). SYN. *Richardia* (of Linnæus). ORD. *Rubiaceæ.* A genus comprising five or six species of stove, erect or prostrate herbs, with perennial roots, natives of the warmer parts of America. Flowers white or pink, small, densely capitate. Leaves opposite, sessile, or shortly petiolate, ovate. *R. scabra* (Mexican Coca Plant) has been employed in medicine under the name of White Ipecacuanha, but its roots are smaller than those of the true plant, and less certain in their effects. Probably none of the species are now grown in this country.

RICHEA (named after Cl. A. Riche, a French naturalist, who died in 1791 when taking part in the Australian Expedition of Entrecasteaux). Including *Cystanthe.* ORD. *Epacrideæ.* A genus comprising eighteen species of greenhouse shrubs or small trees, inhabiting the mountains of Tasmania and South-eastern Australia. Flowers white or pink, in terminal spikes or panicles; calyx of five sepals, bracteate and bracteolate; corolla ovoid or conical, the lobes not separating; stamens hypogynous. Leaves sheathing at base, narrow, short or elongated, concave, sometimes grass-like, entire or serrulated. Branchlets marked with the scars of fallen leaves. The following are the only species introduced. For culture, *see* **Sprengelia.**

R. pandanifolia (Pandanus-leaved). *fl.* small, in ovate panicles, 2in. to 3in. long, on peduncles 4in. to 8in. long. Trunk naked, simple or sparingly branched, 6in. to 9in. in diameter, crowned by a large tuft of long, wavy leaves, like those of a Pandanus, often 3ft. to 5ft. long, tapering into a long point, and cartilaginously toothed. *h.* 20ft. to 36ft. 1884. Tree.

R. sprengelioides (Sprengelia-like). *fl.* reddish, in terminal, globular, leafy heads, each one nearly sessile within a floral leaf. June. *l.* broadly ovate-lanceolate, tapering to a short, rigid point, straight or slightly undulated or twisted, ¼in. to ½in. long, the floral ones gradually smaller. 1836. A bushy shrub, usually low, but sometimes attaining a height of several feet.

RICHEA (of Labillardière). A synonym of **Craspedia** (which *see*).

RICINUS (from *ricinus*, a tick; which insects the seeds are supposed to resemble). ORD. *Euphorbiaceæ.* A monotypic genus. The species is with us a well-known, tall, half-hardy, annual herb, but, in warmer regions, it grows as an arborescent shrub. Castor oil is yielded by the seeds of this plant, which, together with the capsules, are very variable. Any rich soil is suitable for the culture of *Ricinus*, and propagation may be readily effected by seeds, which should be sown and placed in heat early in March. It is best to sow single seeds in small pots, as the roots quickly become matted when there are many plants together, and cannot be separated without causing a severe check.

Ricinus—*continued.*

Young plants must be kept growing on under glass until early in June, when they may be hardened and put into their permanent positions outside. Varieties of *Ricinus* are most useful subjects for sub-tropical gardening, on account of their handsome foliage.

FIG. 381. RICINUS COMMUNIS.

R. communis (common).* Castor-oil Plant; Palma-Christi. *fl.* green, apetalous, rather large, disposed in sub-paniculate racemes at the apices of the branches; upper flowers male, clustered; lower ones female, shortly pedicellate. July. *fr.*, capsule smooth or prickly. *l.* alternate, ample, peltate, palmately seven or many-lobed; lobes serrated. *h.* 3ft. to 5ft. Probably of tropical African origin, but broadly dispersed, and naturalised throughout tropical regions, 1548. See Fig. 381. (B. M. 2209; S. F. G. 952; A. B. R. 430, under name of *R. armatus*.) There are several varieties of this species; the one grown under the name of *R. Gibsonii* having bronzy-purplish leaves.

RICOTIA (probably named after M. Ricot, an obscure botanist). ORD. *Cruciferæ*. A small genus (four species) of closely-allied, hardy, glabrous, branched herbs, natives of North Africa, Syria, and Asia Minor. Flowers pale lilac, in elongated, ebracteate racemes; sepals valvate, the lateral ones saccate at base; petals obcordate, unguiculate. Pods sessile, oblong, much compressed. Leaves almost bipinnatisect. *R. Lunaria*, the only species known in gardens, is a pretty annual, well adapted for ornamenting rockwork. A light, sandy soil suits it best. Seeds should be sown either on the rockwork or in the open border.

R. Lunaria (moon-podded). *fl.*, petals lilac, with white claws; pedicels filiform. June and July. Pods ovate-lanceolate. *l.* with oblong, sinuated, angular lobes. *h.* 9in. Syria, Egypt, 1757. (B. R. 49, under name of *R. ægyptiaca*.)

RICTUS. The mouth or gorge of a bilabiate corolla.

RIDERS. A name given to tall-stemmed fruit-trees that are used for covering the upper surface of high walls, either temporarily or permanently, while the lower part is furnished with dwarf trees.

RIDGES. In gardens, this term denotes the shape in which it is often desirable to arrange heaps of soil, manure, &c., for various cultural purposes. Ridge Cucumbers, for instance, are so designated because they succeed better on a heap of manure and soil formed in the shape which the name indicates, than on the level ground. Land dug or trenched in autumn is usually thrown unevenly into Ridges, to expose more of the surface to the action of frost than would be possible if it were made level. Soil, after being thus exposed all winter, may readily be broken and levelled down in spring, and, in this way, heavy land especially may be greatly improved, even in one season. Many other familiar instances might be cited, were it necessary, in favour of forming a Ridge in preference to another shape.

RIGIDELLA (a diminutive of *rigidus*, rigid; in allusion to the erect seed-bearing stalks). Stiff Stalk. ORD. *Irideæ*. Of this genus three species have been described; they are very ornamental, greenhouse plants, with truncated bulbs, natives of Mexico and Central America. Flowers several in a spathe, sometimes numerous, long-pedicellate; perianth cup-shaped at base, three-parted, spreading or reflexed, having no tube; stamens three; filaments connate into a cylindrical tube; spathes long, membranous, terminating the two or three long peduncles in the axils of the floral leaves. Capsule exserted. Radical leaves few, long, sometimes broad, plicate-veined, contracted into a long petiole; floral ones long-acuminate. For culture, *see* **Tigridia.**

R. flammea (flame-coloured). *fl.* bright flame-coloured, strongly marked at the base of the reflexed limb with deep purple stripes, drooping, in a dense umbel from within a two-valved spathe; tube campanulate. May. *l.* broad, equitant, strongly plaited, dilated at the base, where they sheath the stem. *h.* 3ft. to 5ft. Mexico, 1839. (B. R. 1840, 16; P. M. B. vii. 247.)

R. immaculata (unspotted). *fl.*, sepals scarlet, acute, 1⅜in. long, with a paler claw; petals yellow, cordate, acuminate. June. *h.* 2ft. Guatemala, 1839. This differs from *R. flammea* mainly in having smaller, unspotted flowers, and narrower leaves; the plant, also, is more slender. (B. R. 1841, 68; F. d. S. 502.)

R. orthantha (upright-flowered). *fl.* terminal, fasciculate, nodding; perianth deep vivid scarlet, with a triangular, black spot at the base of each segment, somewhat concave, divided at the base; anthers dark brown; stigmas deep pink. October. *l.* lanceolate, plaited, sheathing. *h.* 1½ft. Mexico, 1846. (P. M. B. xiv. 121.)

RIMA. A synonym of *Artocarpus*.

RIMOSE. Marked on the surface with chinks or cracks, like those of old bark.

RIND-GRAFTING. *See* **Grafting.**

RING-BUDDING. *See* **Budding.**

RINGED. Surrounded by elevated or depressed, circular bands or lines; *e.g.*, the roots or stems of some plants, the cups of several species of *Quercus*, &c.

RINGENT. Gaping; *e.g.*, the mouth of an open bilabiate corolla.

RINGING. A method of preparing layers for propagation. *See* under **Layering.**

RINGWORM ROOT. *See* **Rhinacanthus communis.**

RIOCREUXIA (named after A. Riocreux, a celebrated botanical artist). ORD. *Asclepiadeæ*. A small genus (four ? species) of slender, pubescent or glabrous, greenhouse, twining sub-shrubs, confined to South Africa. Calyx of five narrow segments; corolla with an elongated tube and linear lobes; corona sub-duplex, the exterior of five to ten scales, the interior of five smaller ones; cymes loose, umbelliform or dichotomous; peduncles simple or branched; pedicels filiform. Leaves opposite, cordate, membranous. *R. torulosa*, the only species introduced, thrives in sandy loam. Plenty of pot room and ample drainage must be afforded. Propagation may be effected by cuttings, taken preferably in spring, and inserted in sand, under a hand glass, with slight bottom heat.

R. torulosa (somewhat twisted). *fl.* pale yellow, flask-shaped, greenish at their ventricose base; umbels pedunculate, lateral or terminal, loose-flowered. Summer. *l.* deeply cordate-ovate. Roots tuberous. 1862. (Ref. B. 157.)

RIPIDIUM. A synonym of *Erianthus*.

RIPOGONUM. *See* **Rhipogonum.**

RITCHIEA (named in honour of Joseph Ritchie, a Yorkshireman, who was killed, in 1819, when exploring Central Africa). ORD. *Capparideæ*. A genus comprising only two or three species of erect or sarmentose, climbing, stove shrubs, natives of tropical Africa. Flowers greenish, large, sweet-smelling, corymbose, long-pedicellate; sepals four, ample, valvate; petals four or many, long-clawed, undulated, oblong, the blade imbricated; torus hemispherical, fleshy. Leaves simple, or three to five-foliolate; stipules obsolete. Only one species calls for mention here; it requires treatment similar to that recommended for **Euadenia** (which *see*).

R. fragrans (fragrant). *fl.* 4in. across; sepals ovate-oblong, deep green; petals about fourteen, pale straw-colour, strap-shaped, acuminate, crumpled above the middle; stamens very numerous, spreading. June. *l.* alternate; leaflets three to five, as long as, or longer than, the petioles, oblong or obovate-lanceolate, shortly petiolulate; petioles slender, 3in. to 5in. long. *h.* 3ft. 1859. An erect shrub. SYN. *R. polypetala* (B. M. 5344).

R. polypetala (many-petaled). A synonym of *R. fragrans*.

RIVEA (dedicated by Choisy to Auguste de la Rive, a physiologist of Geneva). ORD. *Convolvulaceæ*. A genus comprising only a couple of species of stove climbers or twiners, natives of the East Indies. Flowers large, on axillary, one to three-flowered peduncles; sepals ovate or oblong, obtuse; corolla salver-shaped, with a long, cylindrical tube, and an angulately sub-lobed limb; stamens included; filaments short; bracts narrow. Leaves broad beneath, and, as well as the inflorescence, often woolly or silky. The species described below require culture similar to **Ipomœa** (which *see*).

R. hypocrateriformis (salver-shaped). Midnapore Creeper. *fl.* pure white, large, expanding at sunset, and perfuming the air for a considerable distance with a fragrance resembling that of the finest cloves; corolla very wide; peduncles shorter than the petioles. July. *l.* cordate-roundish or altogether roundish, sometimes villous beneath. Western India, &c., 1799. Don says this species is the prince of convolvulaceous plants.

R. ornata (adorned). *fl.*, corolla white, silky without; peduncles mostly three-flowered. June. *l.* orbicularly cordate or reniform, large, clothed with cinereous tomentum beneath. Stem white; branches silky. 1824.

RIVINA (named in honour of A. Q. Rivinus, a native of Saxony, 1652-1722, for some time Professor of Botany and Medicine at Leipsic). Hoop Withy. SYN. *Piercea*. ORD. *Phytolaccaceæ*. A genus comprising, according to Bentham and Hooker, one or two species of stove, erect, dichotomously-branched herbs, shrubby at base, natives of tropical and sub-tropical America. Flowers hermaphrodite, racemose; perianth corolla-like, four-parted; segments obovate-oblong, obtuse, concave, coloured, unchanged and erect or spreading during fructescence; stamens four. Fruit red, pisiform. Leaves alternate, slender-stalked, ovate, ovate-lanceolate, or cordate-ovate, acute, obtuse, or long-acuminate, obscurely

Rivina—*continued.*

crenate, membranous. Rivinas may readily be propagated by seeds or cuttings, which, after being inserted during spring, should be placed in heat. The plants grow freely afterwards in any rich, loamy soil. When covered with berries in winter time, they are exceedingly attractive.

R. humilis (low).* Bloodberry; Rouge Plant. *fl.* whitish-rose, scarcely one line long, sub-reflexed; racemes longer than the leaves. January to October. *fr.*, berries bright scarlet, disposed in racemes. *l.* (including the petiole) 1in. to 2in. long, ovate, acuminate, sub-entire, rather thick, slightly tomentose or densely pubescent. Stem shrubby; branches, petioles, and racemes slightly pubescent. *h.* 1ft. to 2ft. Caribbee Islands, &c., 1699. (B. M. 1781.)

R. lævis (smooth).* *fl.* whitish-rose, small; racemes 1in. to 2in. long. February to September. *fr.*, berries red. *l.* 2½in. to 4in. long, sub-cordate-ovate, acuminate, slightly crenulated, slender, scarcely undulated, highly glabrous. Stem shrubby; branches glabrous. *h.* 7ft. to 8ft. West Indies, 1733. (B. M. 2333.)

R. l. pubescens (downy). A form with white flowers and pubescent leaves and branches. 1699.

RIZOA. A synonym of **Gardoquia** (which *see*).

ROADS. Road-making, under a proper system, is rather an expensive undertaking, particularly when the requisite material is difficult to procure. It is, however, of great importance that an approach Road or carriage drive, leading to a mansion, should be properly lined out, and formed, and be afterwards kept clean and in good repair. The bed should be well drained, and the bottom filled, to a depth of about 1ft., with hard, porous material, such as rough stones; on this should be placed about 3in. of rather finer material, such as broken granite or ballast, and a similar depth of finer gravel still put over the surface. In the formation of Roads, the proper levels must first be ascertained, and the full depth taken out altogether, should the ground be of an unsuitable description. The several depths of the different sorts of material may be best indicated by pegs driven in some 10ft. apart, so that their tops may be used as a guide for working.

ROAN OR ROWAN-TREE. A common name for *Pyrus Aucuparia*.

ROAST-BEEF PLANT. A common name for *Iris fœtidissima*.

ROBERGIA (of Schreber). A synonym of **Rourea** (which *see*).

ROBERGIA FRUTESCENS. A synonym of **Connarus pubescens** (which *see*).

ROBERTSIA. A synonym of **Sideroxylon** (which *see*).

ROBERTSONIA. Included under **Saxifraga** (which *see*).

ROBINIA (named in honour of John Robin, herbalist to Henri IV. of France, and his son, Vespasian Robin, who first cultivated the Locust-tree in Europe). Locust-tree. ORD. *Leguminosæ*. A genus comprising five or six species of mostly hardy, sub-glabrous, clammy, or bristly trees or shrubs, natives of North America and Mexico. Flowers white or rose-purple, in axillary racemes; calyx teeth short and broad, the two upper ones sub-connate; standard ample, reflexed, naked within; wings falcate-oblong, free; keel incurved, obtuse; bracts membranous, very caducous. Leaves impari-pinnate; leaflets entire, reticulate-penniveined; stipules bristly or spiny. The species described below are all hardy and deciduous, and are very handsome subjects for the ornamentation of the shrubbery. Any common soil will suit them, provided it be not too wet. Propagation may be best effected by layering; the rarer kinds, however, are usually increased by grafting on the commoner sorts, especially *R. Pseudacacia*.

R. dubia (doubtful). *fl.* pale rose-coloured, sweet-scented; racemes loose and pendulous. June to August. Pods brown,

Robinia—*continued.*

thickly beset with short prickles. *l.*, leaflets ovate. *h.* 25ft. Hybrid tree.

R. hispida (hispid).* *fl.* deep rose-colour, large, inodorous, in loose and usually pendulous racemes. May and June. Pods glandular-hispid. *l.*, leaflets eleven to eighteen, smooth, ovate or oblong-ovate, rounded or slightly cordate at base, tipped with a long bristle. Branches and stalks more or less bristly. *h.* 3ft. to 8ft. North America, 1743. Shrub or small tree. See Fig. 382. (B. M. 311.)

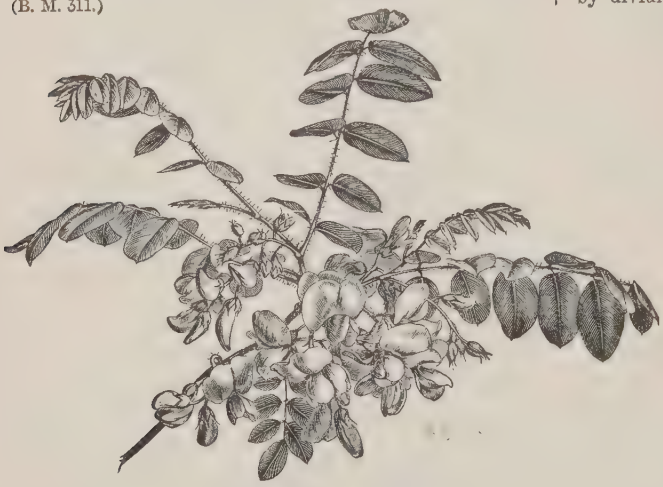


FIG. 382. FLOWERING BRANCH OF ROBINIA HISPIDA.

R. h. macrophylla (large-leaved). *l.*, leaflets large, ovate-roundish. Branches and peduncles glabrous, without prickles. *h.* 10ft. An ornamental variety.

R. jubata (bearded). A synonym of *Caragana jubata.*

R. Pseudacacia.* Bastard Acacia; False Acacia; Common Locust. *fl.* white, fragrant, in slender, loose, pendulous racemes, 3in. to 5in. long; calyx spotted. April and May. Pods smooth. *l.*, leaflets nine to seventeen, oblong-ovate or elliptical. Branches naked. *h.* 30ft. to 60ft. North America, 1640. A tree, with hard and durable wood. There are many varieties of this species in English gardens.

R. P. Bessoniana (Besson's).* Branches thornless. This variety forms a compact, round-headed tree.

R. P. crispa (curled). *l.*, leaflets all, or for the most part, undulately curled. *h.* 40ft.

R. P. Decaisneana (Decaisne's). *fl.* bright rosy-pink. (R. H. 1863, p. 151.)

R. P. fastigiata (pyramidal). A form with a habit similar to that of the Lombardy Poplar.

R. P. inermis (unarmed). A small-growing, round-headed bush. It is usually grafted on tall stems of the common type.

R. P. monophylla (one-leaved). *l.* reduced to a single leaflet.

R. P. semperflorens (ever-flowering). This variety continues flowering throughout the summer. (R. H. 1875, 191.)

R. P. sophoræfolia (Sophora-leaved). *l.* large, somewhat resembling those of *Sophora japonica.* *h.* 25ft.

R. P. stricta (upright). This has the general tendency to grow upright, but the plant is not as fastigiate as the Lombardy Poplar. *h.* 30ft.

R. P. tortuosa (twisted). *fl.*, racemes similar to those of the type, but smaller and fewer-flowered. Branches curiously twisted. *h.* 40ft.

R. P. umbraculifera (umbrella-bearing). *l.*, leaflets ovate. Branches much crowded, smooth. Head orbicular. *h.* 40ft.

Other forms of *R. Pseudacacia* are: *macrophylla*, leaves long, and leaflets broad; *microphylla*, leaves small, and leaflets narrow; *monstrosa*, leaves large and twisted; *pendula*, shoots slightly drooping; *procera*, tall, and vigorous-growing; *spectabilis*, leaves large, shoots straight and vigorous.

R. viscosa (clammy).* *fl.* rose-colour, crowded into roundish, erect racemes, nearly inodorous. May and June. Pods glandular-viscid. *l.*, leaflets eleven to fifteen, ovate and oblong, obtuse or slightly cordate at the base, paler and pubescent beneath, tipped with a short bristle. Branches, petioles, &c., glandular-viscid. *h.* 20ft. to 40ft. North America, 1797. Tree. (B. M. 560, under name of *R. glutinosa.*) *R. bella-rosea* is either a form of this species, without the characteristic viscidity, or a hybrid between it and *R. Pseudacacia.*

ROBIN'S PINCUSHION. A common name for the Rose Bedeguar.

ROBIQUETIA. A synonym of **Saccolabium** (which *see.*)

ROCAMBOLE (*Allium Scorodoprasum*). A hardy perennial, cultivated for the use of its bulbs in a somewhat similar way to those of Garlic. Increase is effected by dividing the bulbs which form, annually, at the root, and also on the tops of the stems. When separated singly, these should be planted, at the end of February or in March, 8in. apart and about 2in. deep. So soon as the leaves decay, lift and dry the bulbs in the sun; they will then be ready for storing for future use.

ROCHEA (named in honour of M. de la Roche, a French botanist). SYN. *Kalosanthes.* ORD. *Crassulaceæ.* A small genus (about four species) of small, greenhouse, shrubby succulents, confined to South Africa. Flowers white, yellow, pink, or scarlet, rather large, aggregated in corymbose-capitate cymes; calyx five-parted or five-fid; corolla salver-shaped, its tube longer than the calyx, the limb five-parted, spreading; stamens five, included. Leaves opposite, connate at base, oblong, obovate, or lanceolate. For culture, *see* **Crassula.**

R. coccinea (scarlet). This is the correct name of the plant described in this work as *Crassula coccinea.*

R. jasminea (Jasmine-like). This is the correct name of the plant described in this work as *Crassula jasminea.*

R. odoratissima (very fragrant). *fl.* pale yellow or creamy-white, sometimes rosy, sweet-scented, about 1in. long; limb of the petals lanceolate; cymes many-flowered. June. *l.* erecto-patent, linear-lanceolate or subulate, 1in. to 1½in. long, taper-pointed. Stem erect, 1ft. to 1½ft. high, scabrous, much-branched or nearly simple. 1793. SYN. *Crassula odoratissima* (A. B. R. 26).

R. versicolor (various-coloured). This is the correct name of the plant described in this work as *Crassula versicolor.*

ROCHELIA. A synonym of **Echinospermum** (which *see*).

ROCK BEAUTY. A common name for *Draba pyrenaica.*

ROCK BRAKE. *See* **Cryptogramme.**

ROCK CRESS. *See* **Arabis.**

ROCK CRESS, PURPLE. A common name for *Aubrietia deltoidea purpurea.*

ROCKERIES. Where alpines and perennials are cultivated in any great quantity, it is essential that some sort of a Rockery should be provided for the accommodation of the rarer and dwarf-growing species. It may be on a small or an unlimited scale, according to the extent of the collection; in any case, this style of gardening affords very great interest, especially when the plants can be induced to succeed. Besides alpines and dwarf perennials, there are numerous other subjects that may often be appropriately introduced, such as hardy Ferns, Yuccas, compact-growing shrubs, Junipers, hardy Heaths, &c. When constructing a Rockery, the principal object should be to provide situations, and allow sufficient space amongst the stones for the plants to grow. The outline or shape can be formed by building up such ordinary soil as may be at command; the stones can then be embedded over any part of the surface desired, and a new compost added at the time the plants are arranged and inserted. Rockwork is generally constructed of stone, if this is procurable; but frequently other substitutes, such as old bricks, clinkers, &c., have to be utilised. Little can be said respecting the proper arrangement, as this varies, in almost every individual case, to suit the situation, plants available, and the surroundings. A background of some sort is desirable, for affording shelter and protection from cutting winds;

Rockeries—*continued.*

Rhododendrons are well suited for the purpose, as they grow tall if allowed, and their roots never spread far enough to rob the rock plants, as would those of large trees. To meet the requirements of the numerous subjects available for planting on a Rockery, it is requisite to provide various aspects and different kinds of soil; and, in planting, a knowledge of the habit each plant assumes is necessary, in order to dispose of all to the best advantage for producing a future effect. A general fault is to allow too little rooting space, by making the pockets—as the divisions between the stones are generally called—too small. This should specially be avoided; if roots cannot get down and establish themselves, the plants soon become dried up in hot weather, particularly on sunny exposures. The class of plants which thrive best on rockwork—indeed, there are many that could scarcely be grown except in such a situation—is a very extensive one, and includes a large proportion of beautiful and most interesting subjects. If dwarf shrubs and other plants, also hardy bulbs, are introduced, the variety that may be represented in the limited space which a Rockery usually affords is really surprising. A very large proportion of the genera *Saxifraga* and *Sedum* make excellent rockwork plants. Other remarks on this subject may be found under *Rock Garden* in the article **Garden.**

ROCKET. *See* **Hesperis matronalis.**

ROCKET CANDYTUFT. *See* **Iberis coronaria.**

ROCKET, DAME'S OR WHITE. *See* **Hesperis matronalis.**

ROCKET, DYERS'. A common name for *Reseda Luteola.*

ROCKET, SEA. *See* **Cakile.**

ROCKFOIL. A name, suggested by Ruskin, for the genus *Saxifraga.*

ROCK PINK. *See* **Dianthus petræus.**

ROCK ROSE. *See* **Cistus.**

RODGERSIA (named in honour of Admiral Rodgers, of the United States Navy, commander of the expedition during which the plant was first discovered). ORD. *Saxifrageæ.* A monotypic genus. The species is a hardy, erect, herbaceous perennial, with a thick, scaly rhizome. It thrives best in a compost of rich loam and peat, and may be increased by divisions.

R. japonica (Japanese). A synonym of *R. podophylla.*

R. podophylla (stalked-leaved). Rodgers' Bronze-Leaf. *fl.* of a yellowish-white colour, somewhat nodding, ebracteate; calyx tube very short, turbinate; lobes five, spreading, valvate; petals wanting; stamens ten; filaments elongated; cymes scorpioid, disposed in ample, naked panicles. June and July. *l.* three to five, large, alternate; radical ones larger, long-stalked, palmately or peltately five-sected; cauline ones three-lobed; segments sessile, argutely serrated, incised at apex; petioles dilated at base; stipules membranous, adnate to the petioles. *h.* 3ft. to 4ft. Japan, 1880. (B. M. 6691; G. C. n. s., xx. 141.) SYN. *R. japonica* (R. G. 708).

RODRIGUEZIA (named in honour of Em. Rodriguez, a Spanish physician and botanist). *Burlingtonia* is now regarded, by the authors of the "Genera Plantarum," as synonymous with this genus, but is kept distinct in this work. ORD. *Orchideæ.* A genus comprising about a score of species of interesting, stove, epiphytal orchids, natives of tropical America. Flowers usually showy, many in a simple raceme; dorsal sepal free, petaloid, the lateral ones narrow, connate; petals similar to the dorsal sepal; lip continuous, or very shortly connate with the base of the column, the base often produced into a spur, the lamina spreading, obovate or obcordate, often exceeding the sepals, the disk usually crested; column erect, slender, club-shaped or produced into two auricles at the apex; pollen masses two; scapes axillary under the pseudo-bulbs. Leaves oblong or elongated, coriaceous. For culture of the species described below, *see* **Burlingtonia.**

Rodriguezia—*continued.*

R. Batemani (Bateman's). This is the correct name of the plant described in this work as *Burlingtonia Batemani.*

R. caloplectron (beautiful-spurred). *fl.* light yellowish-white, twisted; lateral sepals forming a long, compressed, horn-like, acute body, wrapping round the spur of the emarginate lip; column square-winged; inflorescence usually pendulous, few-flowered. *l.* solitary, thick, lanceolate, acuminate. Pseudo-bulbs small, oblong-ligulate. New Grenada, 1871.

R. lanceolata (lanceolate). A synonym of *R. secunda.*

R. Leeana (Lee's). *fl.* the size of those of *Burlingtonia candida*; ovary light mauve; upper sepal white, yellowish on mid-line; lateral ones white with yellow mid-line, quite connate; petals ligulate; lip clawed, white, with two long-linear, yellow keels, every keel having four small, lateral keels spreading outwards; column white, with numerous mauve spots. *l.* linear-ligulate, acute, 1ft. long. Pseudo-bulbs ancipitous. Native country uncertain, 1883. A curious and very stout species.

R. Lehmanni (Lehmann's). *fl.* whitish-ochre, with a brown wash; odd sepal gibbous-fornicate in the middle; lateral ones combined in a narrow, falcate, spur-like organ, with a broad, membranous lamina before the apex; petals cuneate-obovate, emarginate; lip having a solid, acute spur between the lateral sepals, the free part clawed, suddenly enlarged in a blade, blotched and spotted with cinnamon. New Grenada and Ecuador, 1882. (G. C. xix. 403.)

R. refracta (bent back). *fl.* of a peculiar yellow-salmon colour, few, in a porrect raceme; dorsal sepal cuneate-obovate, bluntly acute, the lateral ones combined into one navicular, narrow body; petals cuneate-obovate; lip clawed, expanding into an emarginate blade, having on both sides four or five angular keels. *l.* of pseudo-bulb cuneate-oblong, acute. Peru. (Ref. B. 129.)

R. secunda (side-flowering). *fl.* dark rose-colour, disposed in a cylindrical, recurved spike, which is longer than the leaves; sepals fornicate; petals ovate, obtuse; lip abruptly deflexed. *l.* lanceolate, obliquely emarginate at the apex. Pseudo-bulbs oval, compressed. *h.* 6in. Trinidad, 1820. (B. M. 3524; B. R. 930.) SYNS. *R. lanceolata* (L. B. C. 676), *Pleurothallis coccinea* (H. E. F. 129).

RODS, BONING OR BORNING. These are invaluable instruments in levelling ground, or for determining heights in making an incline uniform throughout. They are always requisite when laying out new walks or edges, levelling turf, &c. There are usually three made, straight, and of equal length, about 3½ft. or 4ft., and provided with cross-pieces, which should be fixed in the centre, and at exact right angles. Before Borning Rods can be brought into use, it is necessary that two points should be fixed, preferably at the extreme ends of the ground to be levelled, should these not be too far apart. If level pegs are inserted at these points, and two of the three Rods allowed to rest on them, as many intermediate pegs may be inserted as thought desirable for guiding workmen. This is done by a third person with the other Rod, who drives pegs in as he is directed from one of the ends, until all the Rods are in, as near as possible, a direct line. The tops of the pegs, if the levelling is properly done, should then show all inequalities in the soil, and represent themselves either a level surface or a uniform incline, according to the disposition of the ground and the comparative heights of the two fixed points taken at the commencement. Boning or Borning Rods of equal length can only be used correctly by persons accustomed to them, as the light is found most deceiving at a distance. Sometimes, one of the Rods is made an inch longer, and a small sight-hole pierced through the cross-piece. By using this, it is possible to work with more exactness, as a workman who might be able to level through a sight-hole might not be able to do so correctly were all the Rods made of equal length, and no sight-hole pierced.

RODS, MEASURING. For regulating the distance between rows and beds, and for marking out spaces for walks between trees, &c., Measuring Rods of some description are indispensable. Either 10ft. or 12ft. is a handy length; the first foot length should be marked in inches, and all the others at intervals of 3in. Straight Rods 1¼in. square are suitable.

ROEBUCK BERRY. The fruit of *Rubus saxatilis.*

ROELLA (named in honour of William Roell, Professor of Anatomy at Amsterdam). ORD. *Campanulaceæ*. A genus comprising eleven species of greenhouse, rigid sub-shrubs or small, diffuse herbs, confined to South Africa. Flowers sessile within the imbricating leaves, solitary or glomerate; calyx with an adnate, oblong or cylindrical tube and a five-parted limb, the lobes often toothed; corolla campanulate or funnel-shaped, five-lobed. Leaves scattered, small or narrow, often rather rigid and fascicled at the axils, entire or ciliate-toothed. Several of the species have been introduced, but that described below is the most desirable. A compost of sandy loam and peat is most suitable for its culture. Propagation may be effected by seeds; or by young cuttings, which will root freely in the soil above-named, if a hand glass be placed over them.

R. ciliata (ciliated-leaved). African Harebell. *fl.* solitary, terminal; corolla white at base, with a deep purple circle, above pale violet, girded by white, the lobes rose-coloured. September. *l.* erect, linear, acuminated, ciliated; upper ones longer. *h.* 6in. to 12in. 1774. (B. M. 378; F. d. S. 517; L. B. C. 1156.)

RŒMERIA (named in honour of John James Rœmer, 1763-1819, Professor of Botany at Landshut, and author of several botanical works). SYN. *Romeria*. ORD. *Papaveraceæ*. A genus comprising only two species (and these, perhaps, varieties of one) of very pretty, hardy, annual herbs. Seeds should be sown in the open border, in spring, where the plants are to remain.

R. hybrida (hybrid). Violet-flowered Horned Poppy; Wind Rose. *fl.* violet-purple with a black disk; sepals hairy. May and June. Capsules 2in. to 3in. long, cylindric, hispid above. *l.* once or twice pinnatifid; segments tipped by a bristle. Stem erect. *h.* 2ft. South and West Europe, &c. (Britain). This plant has the habit of *Papaver Argemone*. (Sy. En. B. 64.) SYN. *R. refracta*.

R. refracta (bent back). A synonym of *R. hybrida*.

RŒMERIA (of Trattinick). A synonym of **Steriphoma** (which *see*).

RŒPERA. Included under **Zygophyllum** (which *see*).

ROEZLIA (named in honour of Roezl, a well-known collector, who travelled in Mexico, Central America, &c.). ORD. *Melastomaceæ*. A monotypic genus. The species is an erect, stove shrub, requiring culture similar to **Monochætum** (which *see*).

R. granadensis (New Granada).* *fl.* carmine-purple; calyx red, four-lobed; petals four, roundish-ovate, emarginate; stamens four; panicles terminal, many-flowered; peduncles glabrous or nearly so. Autumn. *l.* opposite, petiolate, ovate-lanceolate, hairy on both sides, entire, five to seven-nerved. Branches subangular. *h.* about 3ft. New Granada. (R. G. 706.)

R. regia (royal). A synonym of *Furcræa Bedinghausii*.

ROGATION FLOWER. *See* **Polygala vulgaris.**

ROGIERA. Included under **Rondeletia** (which *see*).

ROHDEA (named in honour of Mich. Rohde, physician and botanist, of Bremen). SYN. *Titragyne*. ORD. *Liliaceæ*. A monotypic genus. The species is a greenhouse or half-hardy, perennial, with a short, thick rhizome. For culture, *see* **Reineckea.**

R. japonica (Japanese). *fl.*, perianth white, fleshy, ⅜in. long and thick; spike very dense, 1in. to 2in. long. January to April. *l.* all radical, nine to twelve in a rosette, sub-erect, sessile, oblanceolate, 1ft. long, 2in. to 3in. broad, glabrous, acute. *h.* 2ft. Japan, 1783. (B. M. 898, under name of *Orontium japonicum*.)

ROHRIA. A synonym of *Berkheya*.

ROLANDRA (named in honour of Daniel Rolander, a pupil of Linnæus, who visited Surinam). ORD. *Compositæ*. A monotypic genus. The species is a greenhouse, evergreen shrub, with inconspicuous, white flowerheads and penniveined leaves, native of tropical America. It is probably lost to cultivation.

ROLLERS AND ROLLING. For keeping walks firm and in good condition, an iron Roller is requisite in gardens. The size must be determined by the extent and width of the walks to be Rolled. New gravel walks should always have a light Roller passed over them first, and a heavy one afterwards. Others, if they are firm, and have been well made in the first place, should bear a heavy weight always. Rollers of almost any size may be obtained in iron up to several hundredweights. Rolling should only be practised when walks are sufficiently dry to keep the gravel from clinging; the proper time frequently does not last long, and, when walks are rough, an opportunity for Rolling them should not be lost.

Rollers and Rolling—*continued.*

ROMANA. A synonym of *Buddleia*.

ROMANZOFFIA (named in honour of Count Romanzov, a Russian nobleman, who was a patron of scientific studies). ORD. *Hydrophyllaceæ*. A genus consisting of only two species of low, tufted, hardy perennial herbs, having much the appearance of Saxifrages; they inhabit the sub-arctic regions of Eastern Asia and Western America. Flowers white, unilaterally racemose; calyx segments five; corolla broadly or tubularly campanulate with five imbricated, spreading lobes; stamens five, affixed to the base of the corolla. Radical leaves long-stalked, cauline ones very few, orbicular-reniform, deeply toothed. *R. sitchensis*, the only species introduced, is a suitable subject for planting on rockwork. It requires much the same culture as **Saxifraga** (which *see*).

R. sitchensis (Sitcha).* Sitka Water Leaf. *fl.* white; corolla nearly thrice the length of the calyx; peduncles straight. April. *l.* long-stalked, somewhat rounded-reniform in shape. *h.* 4in. Sitcha, 1873. (B. M. 6109; R. G. 748.)

ROMERIA. A synonym of **Rœmeria** (which *see*).

ROMNEYA (named after the Rev. Dr. T. Romney Robinson, an astronomer, of Armagh). ORD. *Papaveraceæ*. A monotypic genus. The species is a tall, showy, branched, glabrous, herbaceous perennial, allied to *Platystigma*. Although a half-hardy plant, it nevertheless thrives best, and produces larger and more abundant flowers if allowed space in a cool greenhouse. A rich, sandy loam soil is most suitable. The species may be increased by means of seeds, sown in the spring.

R. Coulteri (Coulter's).* *fl.* white, showy, terminating the branches, corymbose or solitary; sepals three, scarcely 1in. long; petals six, biseriate, 2½in. long, broadly obovate, thickened at the base; stamens very numerous, many-seriate. Summer. *l.* petiolate, glabrous, glaucous, pinnatifid, setose-ciliated on the margins; lower segments linear-lanceolate, upper ones deltoid; petioles one-fourth the length of the leaves. *h.* 2ft. to 4ft. California, 1875. (F. M. 252; G. C. n. s., iii. 280; Gn. xi. 374; R. G. 1876, 152.)

ROMULEA (a name commemorative of Romulus, the mythical founder of Rome). SYN. *Trichonema*. Including *Spatalanthus*. ORD. *Irideæ*. A genus of pretty, greenhouse or hardy, bulbous plants, natives of Western Europe, the Mediterranean region, and South and West Africa. Fifty-four species have been enumerated, but, according to the authors of the "Genera Plantarum," many of these are reducible to mere varieties. Mr. Baker, in his review of the genus published in the "Journal of the Linnean Society," xvi. 86, accords specific rank to thirty-six. Flowers one to a spathe, sub-sessile or shortly pedicellate; perianth funnel-shaped, with a very short, or rarely elongated, tube, and equal, erecto-patent, entire lobes; stamens affixed to the throat; spathes long-pedunculate in the axils of the floral leaves; bracts beneath the ovary at the apex of the pedicel shorter, and sometimes broader, than the spathe. Radical leaves linear, sometimes subulate, the sheaths rarely lanceolate-dilated; cauline leaves similar, but smaller. The species described below are those best known to cultivation. They require to be planted out in a pit or frame, in a compost of sandy loam and peat. Propagation may be effected by offsets.

R. bulbocodioides (Bulbocodium-like). *fl.* greenish-yellow; outer spathe valve navicular-convolute, inner one very slender and dark-striped; scape terete, two-sheathed. June. *l.*, radical ones fistular-sheathing; cauline ones binate, in threes, or rarely solitary, alternating with the peduncles. *h.* 6in. Cape of Good Hope, 1810. Greenhouse. (B. M. 1392, under name of *Trichonema caulescens*.)

Romulea—*continued.*

R. Bulbocodium (Bulbocodium).* *fl.* yellow below, violet above the middle, large; spathe two-valved, the outer valve ovate, carinate, the inner one broad and purple-spotted; scape simple, rarely bifid, densely leafy. March. *l.* linear-ensiform, furcate, channelled and sheathing at base, arcuately recurved. *h.* 6in. South Europe, 1739. Hardy. (Fl. Ment. 93A; B. M. 265, under name of *Ixia Bulbocodium.*) A variety, *P. Pylium*, has white flowers marked with purple, borne on a many-flowered scape. (B. R. xxx. 40, Fig. 2, under name of *Trichonema Pylium.*) *P. subpalustre* is a form having white flowers margined with blue. (B. R. xxx. 40, Fig. 1, under name of *Trichonema palustre.*)

R. Columnæ (Columna's). *fl.* greenish outside, whitish within, with purple veins and a yellow base, one to three on a very short scape; spathe longer than the perianth tube. March to May. *l.* wiry, 2in. to 4in. long, recurved, sub-cylindric, grooved above. South and West Europe (Britain), &c. (Fl. Ment. 91.) SYN. *Trichonema Columnæ* (Sy. En. B. 1492).

R. cruciata (cruciate). *fl.* rose-coloured, terminal, erect; outer spathe valve striated and purple-spotted, inner one dark-striped and dotted; scape simple or branched. May. *l.* long-sheathing at base, four-ribbed on both sides, undulately recurved. *h.* 6in. Cape of Good Hope, 1758. Half-hardy. (B. M. 575, under name of *Trichonema cruciatum.*)

R. pudica (chaste). *fl.* pink, with violet spots at the base, terminal, pedunculate; spathe valves striate, keeled, equal; scape terete, short, simple, curved. August. *l.* lanceolate-linear, tricostate-bisulcate; upper ones ventricose-sheathing. *h.* 6in. Cape of Good Hope, 1808. Greenhouse. (B. M. 1244, under name of *Trichonema pudicum.*)

R. ramiflora (branch-flowered). *fl.* yellow in the throat, rather small; outer segments yellowish outside, and deep or pale lilac in the upper part; inner segments purple in the upper part inside and out; scape elongated, two or three-flowered. May. *l.* 6in. to 12in. in length, stout, straight or recurved. Naples, 1830. Hardy. (Fl. Ment. 92; S. B. F. G. 596, under name of *Trichonema ramiflora.*)

R. rosea (rosy). *fl.* rose-coloured, yellow at base, terminal, stalked, campanulate; spathe valves broadly ovate, acute, striated, purple-spotted; scape terete, simple, leafy. July. *l.* recurved, long-sheathing at base, often slenderly ciliated on the ribs. *h.* 6in. Cape of Good Hope, 1818. Greenhouse. (B. M. 1225, under name of *Trichonema roseum.*)

R. speciosa (showy).* *fl.* rose-coloured, yellow and violet-striped at the base of the segments; outer spathe valve convolute and striate, inner one ventricose, obtuse, and broader; scape terete, simple, erect, leafy. May. *l.* slender, somewhat Rush-like, four-channelled, long-sheathing, slightly twisted. *h.* 6in. Cape of Good Hope, 1808. Greenhouse. (A. B. R. 170, under name of *Bulbocodium speciosum*; B. M. 1476, under name of *Trichonema speciosum*; S. B. F. G. 300, under name of *Spatalanthus speciosus.*)

RONDELETIA (named in memory of William Rondelet, 1507-1566, a scientific physician, whose attention was chiefly devoted to fishes and algæ). SYNS. *Arachnimorpha*, *Lightfootia* (of Schreber), and *Willdenovia*. Including *Rogiera*. ORD. *Rubiaceæ*. A genus comprising about sixty species of stove evergreen shrubs and (rarely) trees, with terete branchlets, natives of the West Indies and tropical America, but very rare in Guiana and Peru. Flowers white, yellow, or red, small, pedicellate, disposed in corymbose or paniculate, axillary or rarely terminal cymes; calyx four or five-lobed, persistent; corolla funnel or salver-shaped, the limb of four or five spreading lobes; stamens four or five. Leaves opposite, rarely ternately whorled, sessile or petiolate, coriaceous or membranous; stipules broad, interpetiolar, deciduous or persistent. Many of the species are very pretty, and well deserving of a position in the stove. The most suitable soil is a compost of loam, peat, and sand. Propagation may be readily effected by cuttings, inserted in sand, under a bell glass, in heat. A selection of the best-known species is given below.

R. americana (American). *fl.* white, slightly odorous; cymes axillary, corymbiform, long-pedunculate, pubescent. August. *l.* lanceolate-oblong, 2in. long, pointed, acuminate at base, glabrous, hispidulous on the nerves within; stipules hairy within. *h.* 5ft. West Indies, 1752.

R. amœna (pleasing).* *fl.* of a beautiful pink colour, golden-bearded at the throat, clustered; lobes of corolla emarginate. June. *l.* broadly oblong, 2in. to 5in. long, acuminate, nerved. *h.* 4ft. Guatemala. SYNS. *R. versicolor* (B. M. 4579), *Rogiera amœna* (F. d. S. 442; L. & P. F. G. i. 143).

R. Backhousii (Backhouse's). *fl.* rose-coloured, pedicellate, ½in. to ¾in. long, in terminal, erect, loosely many-flowered panicles; corolla tube pubescent, twice or thrice as long as the calyx lobes. Autumn. *l.* opposite, shortly petioled, 4in. to 9in. long, sub-

Rondeletia—*continued.*

acute, membranous; petioles and veins beneath red. 1860. A small shrub, of unknown origin; it is probably identical with *R. erythronema*, of Karsten. (B. M. 6290.)

R. cordata (heart-shaped).* *fl.* pink, four-parted; cymes terminal, corymbose, many-flowered. Summer. *l.* sub-sessile, ovate or ovate-lanceolate, acuminate, cordate at base, coriaceous, puberulous beneath and on veins, or at length glabrous; stipules ovate-lanceolate, leafy, reflexed. *h.* 4ft. Guatemala, 1844. SYN. *Rogiera cordata* (F. d. S. 754).

R. gratissima (most agreeable).* *fl.* pinkish, sweet-scented, with a long tube and five lobes, disposed in dense, terminal, corymbiform cymes, and not unlike those of the Laurestine. *l.* lanceolate-elliptic. Mexico, 1866. A beautiful, cool stove shrub. (I. H. n. s. 424; F. d. S. 1570-1 and R. G. 490, under name of *Rogiera gratissima.*)

R. hirsuta (hairy). *fl.* yellow; corolla tube externally hairy; cymes axillary, corymbiform, shaggy-pilose, on peduncles as long as the leaves. July. *l.* elliptic or elliptic-oblong, 2in. to 5in. long, cuspidate, rounded or blunt at the base, hispidulous on both sides with scattered down; stipules shaggy-pilose. *h.* 4ft. Jamaica, 1820.

R. laurifolia (Laurel-leaved). *fl.* brownish-yellow, fragrant; corolla sub-rotate; cymes in axillary, hoary-pubescent, racemiform panicles. July. *l.* elliptic-oblong, 3in. to 5in. long, pointed, glabrous; stipules subulate-deltoid, villous within. *h.* 4ft. Jamaica, 1824.

R. odorata (odorous).* *fl.* bright vermilion, fragrant, in terminal, trichotomously compound corymbs; pedicels hairy; corolla salver-shaped, with a narrow tube and a spreading limb. November. *l.* in opposite and rather remote pairs, ovate, acute or somewhat acuminate, entire, waved, on very short petioles. Stem straggling, with rounded, downy branches. *h.* 3ft. Cuba (said also to be Mexican), 1836. (B. 53; B. M. 3953; B. R. 1905.) SYN. *R. speciosa* (L. B. C. 1893; P. M. B. ii. 242, v. 354).

R. o. breviflora (shorter-flowered). *fl.* vermilion or bright orange-red, with a distinct yellow eye; corolla shorter than in the type; limb nearly ½in. in diameter. West Indies. (B. M. 6350.)

R. Purdiei (Purdie's).* *fl.* pale yellow, fragrant, ½in. in diameter, crowded into terminal and axillary, rounded corymbs; corolla with a thickened ring at the throat. Summer. *l.* 3in. to 8in. long, ovate-oblong or almost oblong-lanceolate, but obtuse, narrowed at base into the very short petiole, or suddenly (in the larger lower leaves) terminating in a small, cordate base; midrib red above. *h.* 4ft. Columbia, 1867. An almost silky-pubescent shrub. (B. M. 5669.)

R. racemosa (raceme-flowered). *fl.* white; cymes in axillary, glabrous, racemiform, peduncled panicles. Summer. *l.* elliptic-oblong, 3in. long, pointed, glabrous; stipules deltoid, villous within. *h.* 5ft. Jamaica, 1820.

R. speciosa (showy). A synonym of *R. odorata.*

R. thyrsoidea (thyrse-flowered). *fl.* rusty-yellowish, externally pubescent; cymes in axillary, hoary-pubescent, pyramidal panicles. July. *l.* ovate or elliptic, 3in. to 6in. long, pointed, glabrous above, puberulous with scattered, minute down beneath; stipules deltoid-subulate, strigose within. *h.* 6ft. Jamaica, 1819.

R. versicolor (various-coloured). A synonym of *R. amœna.*

RONNBERGIA (named in honour of M. Ronnberg, Director of Agriculture and Horticulture to the Minister of the Interior of Belgium). ORD. *Bromeliaceæ*. A monotypic genus. The species is a very distinct and remarkable, stove, perennial herb. For culture, *see* **Billbergia.**

R. Morreniana (Morren's).* *fl.* blue, very similar to those of *Billbergia*, disposed in a dense, spike-formed, terminal thyrse. *l.* large, entire, long-stalked, oblong, acuminate, sub-cordate at base, bright green, zonately or transversely marked with bars and spots of a very deep green. Stem erect. New Grenada, 1874. (I. H. 1874, 177.)

RONNOWIA. A synonym of **Omphalea** (which *see*).

ROOF-FOIL. Ruskin's suggested name for the House-leek.

ROOT. *See* **Radix.**

ROOTERIES. These are formed by arranging old roots of trees over a mound of soil, and inserting trailing plants, hardy Ferns, &c., to grow and cover them. Used as a screen, this arrangement is often most effectual; and otherwise valueless tree-stumps may be utilised in place of stones, which are not always to be obtained, for making a rockery instead. One objection to Rooteries is that they often afford a hiding-place and home for numerous kinds of vermin. Rooteries may be piled up in almost any shape, and made to produce, when furnished, a good effect.

ROOT-GRAFTING. *See* **Grafting.**

ROOT-HAIRS. Attenuated, unicellular outgrowths, or hairs, from the newly-formed parts of a root.

ROOTLET. A very slender root, or branch of a root.

ROOT OF SCARCITY. A name applied to the Mangel-Wurzel (*Beta vulgaris macrorhiza*).

ROOT-PRUNING. *See* **Pruning.**

ROOTSTOCK. *See* **Rhizome.**

ROOT-SUCKERS. Shoots which proceed from the root of a plant, and afford, in many instances, a method of increase. *See* **Propagation.**

ROPALA. A synonym of **Roupala** (which *see*).

ROPE GRASS. *See* **Restio.**

ROSA (the old Latin name, from the Greek *rhodon*, which again is taken from the Arabic *ward*, a rose). Rose. Including *Lowea*. ORD. *Rosaceæ*. An important genus of highly ornamental, mostly hardy, erect, sarmentose, or tall climbing, glabrous, silky or glandular-pilose, usually prickly shrubs, dispersed over the whole temperate and sub-alpine regions of the Northern hemisphere, rare in America, extending South as far as Abyssinia, the East Indian Peninsula, and Mexico. About 250 species have been enumerated, and more than 180 described as such, but the number specifically distinct is probably not more than thirty or forty. Flowers white, yellow, pink, or red, ample, showy, solitary or corymbose; calyx ebracteolate, the tube globose, urceolate or ventricose, the throat constricted, the lobes five, very rarely four, spreading, leafy, often pinnatisect, deciduous or persistent, imbricated; petals five, very rarely four, spreading; stamens numerous, in many series, inserted on the disk, the filaments filiform; carpels indefinite, rarely few, free; styles exserted; achenes numerous, included within the baccate tube of the calyx, which, in the fruiting state, is often edible. Leaves alternate, impari-pinnate, very rarely one-foliolate or consisting solely of connate,

FIG. 383. ROSE LEAF, showing Adnate Stipules.

leafy stipules; leaflets often serrated; stipules sheathing at base, and adnate with the petioles (see Fig. 383).

The enumeration of species described in this work is slightly modified from Mr. Baker's admirable "Classification of Garden Roses," which appeared in the "Gardeners' Chronicle" of 1885.

Analytical Key to the Groups.

Leaves simple, exstipulate .. .. 1. SIMPLICIFOLIÆ.
Leaves compound, stipulate.
- Styles forming a column, protruded beyond the disk .. .. .. } 2. SYSTYLÆ.
- Styles not united nor protruded beyond the disk.
  - Stipules nearly free, deciduous .. } 3. BANKSIANÆ.
  - Stipules adnate above the middle, persistent .. .. }

DIACANTHÆ.—Main prickles in pairs at the base of the leaves.

Fruit persistently pilose .. .. .. 4. BRACTEATÆ.
Fruit glabrous .. .. 5. CINNAMOMEÆ.

HETERACANTHÆ.—Prickles scattered, numerous, passing gradually into aciculi and setæ.

Leaves not rugose; large prickles long and slender .. .. } 6. PIMPINELLIFOLIÆ.
Leaves rugose, coriaceous; large prickles short and stout .. .. } 7. CENTIFOLIÆ.

Rosa—*continued.*

HOMOECANTHÆ.—Prickles scattered, comparatively few, sub-equal.

Prickles slender; leaves not glandular below .. .. } 8. VILLOSÆ.
Prickles stout and hooked; leaves not glandular below .. .. } 9. CANINÆ.
Leaves very glandular beneath .. .. 10. RUBIGINOSÆ.

GROUP I. SIMPLICIFOLIÆ.

simplicifolia

GROUP II. SYSTYLÆ.

abyssinica
moschata
multiflora
phœnicia
repens
sempervirens
setigera
stylosa

GROUP III. BANKSIANÆ.

Banksiæ
Fortuneana
microcarpa
sinica

GROUP IV. BRACTEATÆ.

bracteata
involucrata

GROUP V. CINNAMOMEÆ.

In some of these there are only the pairs of prickles at the base of the leaves; but in several of the species there are few or many aciculi in addition. These latter form a connecting link between Groups V. and VI.

anserinæfolia
blanda
carolina
cinnamomea
gymnocarpa
humilis
laxa
lucida
microphylla
nitida
nutkana
pisocarpa
rugosa
sericea

GROUP VI. PIMPINELLIFOLIÆ.

acicularis
alpina
Ecæ
hemisphærica
hibernica
hispida
involuta
lutea
macrophylla
rubella
spinosissima
Webbiana

GROUP VII. CENTIFOLIÆ.

centifolia
damascena
gallica
turbinata

GROUP VIII. VILLOSÆ.

Hackeliana
mollis
orientalis
tomentosa

GROUP IX. CANINÆ.

alba
canina
indica
montana
rubrifolia

GROUP X. RUBIGINOSÆ.

ferox
glutinosa
micrantha
rubiginosa
sepium

Throughout the vegetable kingdom, there is no genus which commands—and receives—so much attention from

Rosa—*continued.*

horticulturists as that now under consideration. The Rose has been immortalised, from the most ancient times, by authors and poets of all countries. As the emblem of Youth, it was dedicated to Aurora; of Love and Beauty, to Venus; of Danger and Fugacity, to Cupid. It was given by the latter, according to classical writers, as a bribe to Harpocrates the God of Silence: hence, undoubtedly, the origin of the common expression, "under the rose." The Rose is the national emblem of England. Apart from the value of the genus as an unrivalled collection of the most beautiful floral objects, it forms an important factor in commerce. The raising of new varieties, &c., and the manufacture of rosewater and attar, give employment to thousands of persons. *Rosa* is also a prominent contributor to our Materia Medica: according to Dr. Lindley, "one of the most earnest defenders of its powers has not hesitated to assure the world that the Pharmacopœia should be formed of Roses alone"! (Introduction to "Rosarum Monographia," 1820.) The Rose, is justly designated the Queen of Flowers. Its easy mode of propagation, its adaptability to meet the requirements of most cases where flowers are needed, and its general floriferous habit, under varied circumstances, are all well-known characteristics. In horticultural exhibitions, throughout the summer, Roses are always largely represented, and many beautiful shows are limited almost exclusively to this one flower alone. For cut flowers, too, Roses are unequalled, and they may be procured, under cultivation, at almost all seasons, especially the invaluable Tea section. For covering arbours, arches, walls, &c., the climbing varieties, which include a good selection, are admirably adapted; while there are hosts of others, suitable for beds by themselves, mixed borders, culture in pots, and for any other purposes where their flowers can be admired. In some places, a Rose Garden is established, and planted with the various sections of the genus; the original species, and those of more recent introduction, are available for affording much interest and beauty in wild gardens, and often for climbing up tall shrubs and trees; several of the dwarf-growing ones are useful for rockeries. It is needless to attempt referring to all the purposes for which the Rose is so well adapted; they are generally familiar, and numerous other books and periodicals refer to the subject in more lengthened terms than is necessary or even possible here. Many of the species are very beautiful, because of the numerous bright-coloured fruits, called "hips," which succeed the flowers. Even the common Dog Rose (*R. canina*) is very ornamental in this respect; and the beautiful *R. rugosa*, where it succeeds, is covered with large fruits towards autumn, while it also continues more or less plentifully to keep flowering. The common Sweetbriar Rose, and many others, are familiar examples, because of their highly-coloured hips.

PROPAGATION. Rose propagation may be accomplished in many ways, namely, by seeds, cuttings, layers, suckers, and sports; sometimes by division; and very extensively by budding and grafting.

Seeds. Raising Roses from seeds is a practice seldom resorted to except for obtaining new and improved varieties. As a rule, only an exceedingly small percentage of seedlings fulfil these conditions, now that good sorts are so numerous; by far the largest majority will be found worthless. When seeds are to be saved, the hips must remain on the plant until quite ripe, when they should be gathered, dried in the sun, and afterwards rubbed out. The seeds may either be sown at once, or the hips may be kept whole, and stored in sand or soil, until spring. Rats and mice are very partial to the seeds, which they devour greedily; it is, therefore, necessary to make provision, as far as possible, against their attacks. Birds are also destructive in the seed-bed, if this is in the open ground. Rose seeds may be sown in a warm, sheltered position in the open

Rosa—*continued.*

air, or in pans or shallow boxes of sandy soil, which may afterwards be placed in a cold frame. The seeds vary a great deal in the time they take to germinate; some seedlings appear the first season, many not until the second. The first autumn, all that are large enough to handle should be transplanted from 6in. to 12in. apart, according to their different sizes, and protection must be provided for these, and for others in seed-beds, throughout the winter. Seedling Roses do not produce their first flowers at any fixed time; some blossom in less than a year, but many more do so the second season, while others take a longer period. The first flowers indicate little beyond the colour; those which follow are often of far better substance and superior merit.

Cuttings. Roses of all kinds on their own roots are now much favoured, and propagation by means of cuttings may be successfully practised from spring until late in autumn. Formerly, the method chiefly adopted was by cuttings made of dormant shoots, and inserted in autumn; and this is still extensively practised. The mode of procedure with ripened cuttings in autumn is very easily explained, and, if the cuttings are good and properly inserted, success is almost as certain as with cuttings of Gooseberries or Currants. Rose cuttings should be made from wood of the current year, which should be of medium strength, and well ripened. They may be cut from 9in. to 12in. in length, and if a heel can be obtained, so much the better, but this is not absolutely essential for striking them. The Hybrid Perpetuals, and any others which are equally as hardy as, or more than, these, may be inserted in the open ground. They should be placed about 6in. deep, and from 1ft. to 1½ft. apart. The best plan is to dig the soil and insert cuttings as the work proceeds; care must be taken to tread round them thoroughly, in order that frost may not lift them out. In preparing cuttings for insertion, none of the eyes should be removed, as frequently, when the upper portion of the cutting dies, shoots proceed from the joints beneath ground, and so the plant is safe. This is one of the advantages Roses raised from cuttings always have over those worked on another stock, namely, that all the shoots thrown up at any time are those of the Rose itself, and if the upper branches are cut down by frost, in all probability the lower portion of the stem will escape injury. Occasionally, after a sharp spell of frost, it will be necessary to tread round cuttings inserted in the previous autumn, to keep them firm and in position. Good plants will be ready for lifting in the course of a year, when they should be transferred to permanent positions for flowering. Cuttings of Tea-scented and other somewhat tender Roses, when inserted in autumn, will not succeed under the system above described; they must be more carefully treated, by being placed in pots of sandy soil, and provided with protection under glass. They may be dibbled in rather close, and merely kept in a cold frame through winter, during which time they will form a callus, and be ready for emitting roots when subjected to a little heat in spring. This valuable section is more generally propagated in summer; but in autumn ripened cuttings may be procured from outside plants, when there are none grown in pots.

Cuttings of Roses may be readily rooted at almost any time during summer, when suitable firm, partially-ripened growths can be obtained. The leaves at this season should be carefully preserved, and cuttings with two or three eyes may be successfully rooted. The first batch may generally be procured early in the season, from plants that have been forced, and none are better suited for propagating. If inserted, and placed in a close frame with a little heat, or on a slight hotbed, and kept moist and shaded, roots will, as a rule, soon be emitted, and the young plants may then be potted off singly, and still

Rosa—*continued.*

grown on for a time under similar conditions until they are sufficiently established to be inured to cooler quarters, gradually hardened, and eventually placed in the open air. At the middle, and towards the latter part, of summer, Rose cuttings, with leaves attached, may be readily rooted under what is termed cool treatment in the open air. A shady position is essential, such as is frequently obtainable against the back wall of a forcing or other plant house which faces south. Bell or hand-glasses are often used; but a better plan is to prepare some sandy soil, and to use the framework of an ordinary rough box, about 10in. deep, and without either bottom or top. Place this on the border, should there be one, put in about 3in. of prepared soil, press it firm, and lay some sand over the surface. All this should be made ready before the cuttings are detached, as they are much injured if allowed to lie about, if only for a short time, before being inserted. Dibble them in rather close, and give a good watering afterwards; make the top as nearly as possible air-tight, by fitting large panes of glass closely to cover it. On the north side of a lean-to house, if this situation is available, but little shading will be necessary, and it is best to leave the glass on without ever removing it until the cuttings show signs of making roots; air may then be gradually admitted. The young plants may be lifted so soon as they are sufficiently established, potted up, and placed in a close frame for a few days; afterwards harden, and get them well ripened before winter.

Layers. Propagation by layering is a sure method of increasing dwarf or weeping Roses that may be brought to the ground, but it is not extensively practised. By layering in June, and early in July, if suitable, firm wood of the current year can be obtained, the rooted plants may be detached the following autumn. When the work is deferred till later in the season, they are not usually ready for removal until the following year. Layering with a tongue is the most successful method. *See* **Layering.**

Suckers. Suckers are sometimes produced by Roses, and may be utilised for increasing stock, if desired. They should be taken off in autumn, and planted out separately; if there are no roots, some will generally form if the suckers are inserted rather deeply in sandy soil, and nursed a little through winter.

Sports. Several varieties have originated from sports that have been observed on Roses, as well as on many other plants, and which arise from some cause which seems to affect the colour more than any other quality. Sports cannot be artificially produced; all that can be done is to perpetuate any which appear, and are worthy of it, by one of the ordinary methods of propagation.

Division. Propagating Roses by division is not much practised, but it may be adopted with such as the Fairy Rose (*R. indica minima*), the Scotch Rose (*R. spinosissima*), and a few others, which spread and grow, as it were, into bushes.

Budding. This is the principal mode of propagating Roses, and the operation is one which may be successfully carried out at the proper season, after a little practice, by almost anyone. Nurserymen who make Roses a speciality have thousands budded annually. Various stocks are used, that most extensively employed being, perhaps, the common Dog Rose of the hedgerows. Stocks obtained from the seed of this plant are also much favoured, in some establishments, for dwarf Roses, particularly Teas. The Manetti is also largely employed. For effecting a union, it is necessary that the stock be in a growing state, sufficiently so to allow of its bark separating freely from the wood beneath. The buds should be dormant, well matured, and preferably obtained from firm shoots that have borne flowers; sappy

Rosa—*continued.*

wood shoots are unsuitable. The latter part of June, and all through July, is the principal season for Rose-budding outside, as the stocks are then in a growing state, and plenty of buds are generally obtainable. Under glass, and with the stocks established in pots, it may be carried out extensively earlier in the season; according as buds can be obtained, the stocks may be introduced into a slight warmth, and soon brought into proper condition. On the process of preparing and inserting buds, full information may be found under **Budding**, where also further remarks are made on the various stocks that are used for Roses.

Grafting. This is an effectual mode of Rose propagation; the whip or splice method and crown-grafting are best suited, but the parts rarely unite so well as they do when budded. Cleft and saddle-grafting are also practicable. Stocks may be of the same sorts as those used for budding. The work is performed principally in January and February under glass, and in the open air during March. When the stocks are in pots, they may be started in a little heat, and so got in advance of the scions, which may be procured in about a fortnight afterwards from well-ripened, dormant trees outside. After the grafts are inserted, the stocks should be returned to the same heat as that in which they have been growing, until a union between the parts has taken place, when they may be gradually hardened off and grown in cooler and more suitable quarters. For description of the methods of grafting above named, *see* **Grafting.**

CULTIVATION. To grow Roses successfully, a rich soil must be provided, such as a deep loam of a stiff rather than light nature, although the plants on their own roots will thrive better in rather light soils than will others worked on the common tall Briar or on seedling Briar stocks. The wild Rose grows naturally in heavy, clay land; under cultivation, it is, consequently, best suited with strong soil of a rich nature. Shallow, sandy or gravelly soils are unsuited for Roses, and so, on the other hand, are any which are improperly drained. In gardens where Rose-beds have to be formed in unfavourable situations, it is best to dig out the natural soil in the first place, and replace it with a properly-prepared compost; or it may be that changing a portion will suffice. A depth of about 1½ft. should be provided for such strong-growing kinds as most of the Hybrid Perpetuals, and a similar depth is advised for all Roses if it can be provided. The soil can scarcely be made too rich; plenty of manure may be added when the ground is being prepared for planting, and an annual top-dressing in addition is generally found beneficial, and indeed necessary, in the production of good flowers. It may be applied with advantage soon after growth commences, in spring; the flowering shoots are then pushing up, and need plenty of feeding from the root. Respecting situations, there are few in which some representative of this beautiful genus may not be grown successfully. It is not convenient, nor, perhaps, desirable, to attempt the formation of a Rose-garden in all gardens, even when they are extensive; but beds of Roses may generally be introduced into flower-gardens and pleasure-grounds, and any quantity of plants, so far as circumstances and space admit, may be put into other positions without any fear being entertained of having too many. For cutting purposes, in private establishments, it is found a good plan to devote a portion of the kitchen garden to Rose-growing, where the ground can be well trenched previous to planting, and enriched with manure at any time when it is considered necessary. For a Rose-garden, an open situation is desirable, with a south or south-eastern aspect, and sheltered from other points, particularly north and east. Climbing Roses are very

Rosa—*continued.*

beautiful, and generally very floriferous; they may be employed with good effect for covering arches, arbours, pillars, &c., and also for training up trees and tall growing shrubs.

Transplanting of all the more hardy Roses may best be done in October and November. Tea varieties, and any others of a tender nature, are generally not safe to withstand the winter unprotected, and are consequently planted in spring. Dwarf plants should be allowed a space of from 2ft. to 3ft. clear between them, standards not less than 3ft. Sometimes, both are planted alternately in beds. Roses are better arranged by themselves in this way than intermixed with other plants; and this remark also applies to the flowers when cut. It is so customary to find Roses mixed with well-nigh everything in the way of cut flowers that few persons keep them exclusively by themselves; but it is only by doing so that their full beauty as cut flowers may be seen. The foliage, too, that belongs to plants from which the flowers have been cut seems to suit each so well individually that some of it should always be used; the foliage, for instance, from Tea Roses does not look well with Hybrid Perpetuals, that of neither sort of leaves will do for mixing with flowers from any of the species, and so forth.

The pruning of different Roses depends a good deal on the class to which they belong, the way in which they are trained, &c. Autumn and spring pruning are practised, the latter most extensively, especially since the springs of late years have been so precarious. If a shoot is shortened back in autumn, the eyes that are left, with the intention of their remaining dormant until the following spring, will often be excited into growth during winter, because of the prevalence of mild weather; they then succumb to the first frost. Spring pruning may generally be performed from the middle to the end of March; but the season varies according to the weather and the state of the trees. The young shoots will frequently grow out several inches at the top; and although this growth will have to be sacrificed, it would be unsafe to prune, unless the season were sufficiently advanced to insure the development of the eyes that are left, without injury from frost. Standard Hybrid Perpetuals have to be cut rather severely to keep their heads within limits. All small shoots should be kept removed, and the strongest ones allowed plenty of space. Dwarf plants of this class may be allowed to grow more freely; but the shoots must be kept thinned, in order that they may become thoroughly ripened. Badly-ripened wood never bears good flowers; it should, therefore, in pruning, be removed first, and afterwards other shoots which are misplaced or tend to cross each other and destroy the form and symmetry of the trees. Hybrid Perpetuals may be cut back to from four to eight eyes, according to their vigour and habit. Teas, in the open air, with a few exceptions, seldom grow very vigorously, and a thinning and slight shortening of the shoots are often all they need. Hardy Pillar and Climbing Roses, such as varieties of *R. sempervirens*, may have their lateral growths shortened back after flowering; this admits light and air to the others left, and but little further pruning will be necessary in spring. If more vigorous shoots are required than those which develop, hard pruning to two or three eyes will cause their production. The amount of pruning which Roses need, and the time and manner of performing the operation, are subjects very widely discussed, and upon which much difference of opinion exists. The principal conditions are: judgment on the part of the operator, a knowledge of the varied habits of Roses, and treatment of each individually as its requirements suggest.

Roses in Pots and under Glass. Greenhouses and conservatories without Roses are rarely found, as, fortunately, no one with a cool glass house need be afraid of

Rosa—*continued.*

inserting a plant to cover the back wall or a portion of the roof, if pot culture cannot be attempted. The Teas are especially well suited for pots, and also the Hybrid Perpetuals; with a sufficient quantity of plants, and by forcing and management, flowers may be obtained nearly or quite the whole year through. Plants for pot culture are best on their own roots—that is, raised from cuttings or layers—but others worked on Manetti stocks or seedling Briars are available. They may be grown from the first in pots, or lifted from the open ground, in September or October, and potted. A rich compost of turfy loam should be provided, with some decayed manure, charcoal, and, if convenient, a few ½in. crushed bones intermixed. If the plants are intended for forcing, they should be established in pots at least for a season; the flowers seldom develop properly on those lifted only a short time from the open ground. The Hybrid Perpetuals may be plunged outside during winter, or until required for forcing, and protected with dry litter or bracken; the Teas should be placed for safety in a cool house or pit. As the growth allowed in pots must be somewhat limited, close pruning will be necessary, particularly in the early stages of training, and the shoots must always be kept well thinned by summer disbudding. Established plants do not need repotting every year; if their roots are healthy and not pot-bound, a top-dressing of rich soil sometimes answers better than potting, and liquid manure may be given when the flowers are developing.

For forcing Roses to flower in early spring, artificial heat is necessary, and the plants should have been grown some time previously in pots, as already noted. After being pruned and otherwise prepared, a portion may be introduced into a little heat during December, or early in January. About 50deg. at first will suffice, but when growth commences, and the days lengthen, this may gradually be raised to about 65deg., with plenty of air on all favourable occasions. Syringing may be practised daily until the flowers begin to expand, when the plants may be transferred to a cool greenhouse, unless they are only required for providing cut flowers, when they should be subjected to a cool temperature and plenty of air. After flowering, the plants may be placed in a sunny position outside until the autumn, but they must not be neglected in watering: the proper maturation of the wood for the succeeding year must be one of the main objects in view.

Other methods of growing Roses have to be adopted when the plants are trained to a greenhouse roof or rafter. For this purpose, they are best planted in a prepared border, which may usually be made inside the house; good soil and drainage must be provided here, as in other situations. Nurserymen supply pot plants specially grown with long shoots for training; or the growths may be easily trained up, if a light, suitable position can be provided, which, however, is not always convenient when stages and hot-water pipes come in the way. Roses permanently planted under glass must be allowed their full season of rest all the winter; their roots should then be kept moderately dry, but almost any quantity of water may be given during the summer. Thinning of the numerous flowerless shoots which appear must be constantly attended to in the growing season. This will admit light and air, and prevent the necessity of removing the large quantity of wood at pruning time that would otherwise be necessary. Many climbing varieties of Tea Roses are unsurpassed amongst greenhouse climbers during spring and summer.

FUNGI. Several species of Fungi, belonging to widely different groups, are parasitic upon the living leaves and young branches of cultivated Roses, and many others are found growing upon dead and withered parts of the plants. The latter do not need further mention, though

Rosa—*continued.*

possibly some of them may be injurious, in their younger stages, to living parts of the Rose-plants. The most generally hurtful of all the true parasitic Fungi is Rose Blight, which is one of the so-called Mildews, and belongs to the group of *Erysipheæ* (*see* **Mildew** and **Oidium**). Its scientific name is *Sphærotheca pannosa*, but it differs generically from *Erysiphe* in little save that in each of the minute, black perithecia scattered over the mycelium there is only one ascus. In this lie eight oval spores. *S. pannosa* grows on all young parts of plants in the form of a dense, pale grey, velvety coat, covering large patches of the surface. The parts attacked by it are much altered in appearance, the leaves becoming blistered and twisted, and the flower-stalks and calyces swollen and distorted. An account of the structure of the Fungi in this family will be found under the headings quoted above. *S. pannosa* is found to grow also on the Peach. The application of powdered sulphur, or of weak solution of sulphide of potassium, will destroy the Fungus without injury to the host-plant.

Another kind of Mildew has been observed on the lower surface of the leaves of Roses in conservatories. This also forms grey patches, but they are less extensive and far less dense than in the former species. Irregular, brownish spots appear on the upper surface of the leaves; they extend over the leaves, which soon wither. These are the work of *Peronospora sparsa*, and bear scattered conidiophores, or slender, branched stalks, on which oval conidia are produced, on the tips of the branches. No remedy is known for this Fungus; and all parts that bear it should be cut off and destroyed. *See* **Peronospora**.

The Rose Rust (*Uredo* or *Lecythea Rosæ*) and the Rose Brand (*Phragmidium mucronatum*) are believed to be forms of a single species of Fungus, the *Uredo* being the summer form of spore, and the *Phragmidium* the autumn form, or teleutospore. Both forms occur scattered in small masses on the lower surface of the leaves; indeed, they grow on the same patches of mycelium; but the Brand appears later in the season. The Rust consists of pale yellow, one-celled, round or oval bodies, covered with very fine, prickly warts. The Brand is made up of very different spores, since each is formed of a row of from four to nine cells, which have a brown, warty outer coat. Each spore is borne on a long stalk, thickened below; and each ends, at the tip, in a long, conical, colourless papilla or outgrowth. This Fungus is seldom dangerous to Roses; but it renders the leaves unsightly. Unfortunately, no cure is known; hence, it is advisable to remove and to burn such leaves as show traces of the Fungus, to prevent it from spreading to healthy plants. *See* **Phragmidium**.

Another Fungus that, at times, renders the leaves of Roses unsightly, is that known as *Asteroma Rosæ*, Lib. (*Actinonema Rosæ*, Fr.), which forms dark purplish-brown spots, with the appearance of fibres radiating from the centre of each. In the spots lie scattered, dark pycnidia, containing two-celled spores. This Fungus is probably only an immature condition of some unknown pyrenomycetous Fungus. To prevent any extension of the slight harm done by it, remove and burn affected leaves.

The leaves are liable to become covered, on the upper surface, with a sooty deposit, imperfect conditions of species of *Capnodium*. *C. Persoonii* has been recorded from Roses on the Continent; but probably the species varies. The Fungus grows chiefly in the secretions of the Aphides so common on Roses; the dark crust obstructs access of light and air to the leaves. The best remedy is to get rid of the Aphides, and to clean the leaves, and keep them clean by syringing or sponging.

INSECTS. In Kaltenbach's "Pflanzenfeinde," nearly 100 species of insects are recorded as more or less hurtful to Roses, *i.e.*, by feeding upon them as larvæ or

Rosa—*continued.*

as perfect insects; and to that number many more could now be added. Hence, only such as are markedly hurtful to these favourite flowers are selected for notice here.

The roots may, at times, be damaged by larvæ of Cockchafers, and other subterranean foes; but these need not detain us. The larvæ of *Agrilus viridis* feed below the bark on stems of Roses, usually close to the origin of a branch. The beetles are from $\frac{1}{5}$in. to $\frac{2}{7}$in. long, rather narrow, and brassy-green or blue; they are not uncommon in the South of England.

The twigs and young leaves are much injured by Aphides or Green Flies, of which five species are recorded, with descriptions and coloured figures, in Buckton's "British Aphides," as feeding on Roses. Of these,

FIG. 384. APHIS (SIPHONOPHORA) ROSÆ—*a*, Line showing the natural length.

Siphonophora Rosæ (see Fig. 384), *S. rosarum*, and *S. dirhoda*, are often very plentiful on Sweet Briar and on the Cabbage Rose, and also attack the wild Dog Rose. Evergreen Roses seem less liable to be injured by them. The other kinds of Aphides are less evidently hurtful. All of them may be treated in the same way. The remedies recommended under **Aphides** will be found useful. It is desirable to keep the plants as free as possible from these insects, alike because of the sap they abstract, and because of their excretions covering the leaves and obstructing the functions of the latter, as well as affording a medium for the growth of dark-coloured Fungi, which still further interfere with the welfare of the plants. The larvæ of a small Moth (*Spilonota roborata*), and those of a Sawfly (*Pœcilosoma candidatum*), bore into the pith of Rose-branches from May to July, of course killing them, and causing the leaves on them to wither. The latter insect has been observed near Oxford by Prof. Westwood, but is, fortunately, rare. The infested branches should be cut off and destroyed while still tenanted by the larvæ. The leaves of Rose-bushes are devoured by numerous insects, mostly Moths and Sawflies. Of the larger Moths, there may be named the **Lackey Moth**, the Gold-tail Moth and its allies (*see* **Liparis**), the Vapourer Moth (*see* **Orgyia antiqua**), the **Bufftip Moth** (*Pygæra bucephala*), the **Winter Moth** (*Cheimatobia brumata*), and the Barred Yellow Moth (*Cidaria fulvata*). Each of these, save the last, will be found described under the headings quoted. *Cidaria fulvata* is a Geometer, about 1in. in spread of wings, with a slender body. It is yellow, with a broad, brown, angled band crossing the front wings, and a pale, triangular spot at the tip, bordered below by a short, dark streak. The larvæ of these moths should be shaken or picked off the bushes, collected, and destroyed. Those of the Winter Moth live between leaflets united by threads of silk. The females of this very destructive species are unable to fly,

Rosa—*continued.*

since their wings are too small to be of use. Hence, they can be prevented from reaching the buds to lay their eggs in them, if the stems and supports of the plants have a belt of any sticky substance (*e.g.*, tar, alone or mixed with grease) smeared on them, and occasionally renewed between November and January, since it is at this season that the moths emerge from the pupæ in the soil.

Among the smaller Moths, a good many species of **Tortricina** (which *see*) feed in leaves of Roses, either joining the leaflets by means of silk threads, or rolling them up in tubes, in which the larvæ live. They may either become pupæ in these shelters, or may lower themselves, when full-fed, to the soil, in which they become pupæ. The larvæ have the habit of lowering themselves by silk threads when the branches are jarred, and advantage may be taken of this habit by placing something below to catch them. Among the commoner and more harmful are *Lozotænia rosana*, *Pardia tripunctana*, *Croesia Bergmanniana*, and *Peronea variegana*; but a good many others might be named which feed on Roses, as well as on other plants. The larvæ of all have much the same habits, and it would occupy too much space to proceed here to distinguish them from one another. In the large group of moths known as *Tineina* (*see* **Moths**), there are a good many that live on Roses. Some of these live in the same manner as the *Tortricina*; but the larvæ of others, belonging to the genera *Nepticula*, *Tischeria*, &c., mine between the surfaces of the leaflets, and disfigure them with pale, wavy lines or blotches. These mines do comparatively little injury to the plants. When desirable, the larvæ may be killed in them by pressure between the finger and thumb, and the numbers may thus be kept down.

The Sawflies (*Tenthredinidæ*) are frequently far more hurtful than the Moths to Rose-bushes, and the number of kinds which, as larvæ, feed on the leaves of Roses, either entirely or partially, is pretty large. For an account of these insects, and of the remedies to be employed, *see* **Rose Sawflies.**

Several gall-flies make galls upon the young twigs and on the leaves: for an account of these, *see* **Rose Galls.** *Typhlocyba Rosæ*, a small insect nearly related to the Frog-hopper (*Aphrophora spumaria*), is often plentiful in all stages on, and is hurtful to, Roses, as well as to Apple-trees. Frequently, large numbers of these insects are to be found on the lower surfaces of the leaves. They are about $\frac{1}{6}$in. long, pale yellow or whitish, with brown feet; the front wings transparent, rarely yellow along the edges; hind wings milky white. The best remedy is said to be the removal and burning of all superfluous branches in early spring.

The flowers are often gnawed and damaged by Beetles; of these, the worst are the **Rosechafer** (which *see*),

FIG. 385. BRACKEN CLOCK (PHYLLOPERTHA HORTICOLA)—*a* Foot much magnified.

and the Bracken Clock (*Phyllopertha horticola*, see Fig. 385), both of which are addicted to eating out the stamens and pistils of Roses, Strawberries, fruit-trees, &c. *P. horticola* is peculiarly abundant in the North. It is about $\frac{1}{4}$in. to $\frac{1}{3}$in. long, green or blue, and pubescent, with rusty-red or bluish-black wing-cases, and a pitted

Rosa—*continued.*

thorax. Where troublesome, the insects may be shaken off the bushes on dull days, and readily captured; on fine days, they are too active to permit of this remedy.

R. abyssinica (Abyssinian). *fl.* white; calyx and peduncles thickly downy. June. *l.*, leaflets shortly stalked, broader towards the point than at the base; petioles very rough with unequal glands and bristles. Prickles very numerous and strong. Otherwise resembling *R. sempervirens*. Abyssinia. (L. R. 13.)

R. acicularis (needle-prickled).* *fl.* pale blush, solitary, fragrant; calyx tube naked; sepals somewhat divided, hairy, longer than the tube; petals obovate, emarginate, spreading, shorter than the sepals; bracts ovate, convex. June. *fr.* yellowish-orange, obovate. *l.* dense, opaque, very glaucous; leaflets about seven, oval, convex, slightly rugose, simply serrated; stipules narrow; petioles naked or a little hairy. Branches erect, clothed with slender, straight prickles and a few bristles. *h.* 8ft. North temperate zone, 1805. (L. R. 8.)

R. alba (white).* *fl.* white or delicate blush, gratefully fragrant; sepals pinnate, reflexed. June and July. *fr.* scarlet or blood-coloured, oblong, unarmed. *l.*, leaflets oblong, glaucous, nearly naked above, simply serrated. Prickles nearly straight or falcate, slender or strong; bristles none. *h.* 4ft. to 7ft. Of garden origin, 1597. Of this plant, which Mr. Baker regards as probably a cross between *R. canina* and *R. gallica*, there are many varieties.

R. alpina (alpine).* *fl.* pink or rose-red, solitary; sepals undivided, spreading; petals obcordate, concave; peduncles after flowering deflexed, and, as well as the calyx, hispid or smooth. June. *fr.* orange-red, ovate or rarely sub-globose, pendulous, more or less elongated. *l.*, leaflets five to eleven, ovate or obovate, argutely or doubly serrated. Young stems prickly; old ones usually naked. *h.* 3ft. Europe, 1683. Of this species there are several varieties. *R. pendulina* is a form with a smooth calyx and elongated, hispid peduncles. *R. pyrenaica* is a form with calyx and peduncles hispid. (B. M. 6724.)

R. anserinæfolia (Anserina-leaved). *fl.* white, in few or many-flowered corymbs, shortly pedicellate; sepals caudate-acuminate, deciduous. Summer. *fr.* smooth, $\frac{1}{4}$in. in diameter. *l.* 1in. to 3in. long; leaflets broadly elliptic, obtuse, simply serrated, $\frac{1}{2}$in. to $\frac{3}{4}$in. long; petioles slender. Branches with few or many unequal, stout, compressed, hooked prickles. *h.* 10ft. Orient. Plant sub-scandent.

R. arvensis (field-loving). A synonym of *R. repens*.

R. Banksiæ (Lady Banks').* *fl.* white and very double, nodding, numerous, small, weakly but pleasantly scented; calyx tube hemispherical; sepals entire, pointed; peduncles naked, very slender. June. *l.*, leaflets one to five, flat, oblong-lanceolate, obtuse, often waved, simply serrated, very hairy at base of middle nerve; petioles naked, rarely hairy. Branches unarmed, weak, climbing. *h.* 20ft. China, 1809. (B. M. 1924; B. R. 397.)

R. B. lutea (yellow). A yellow-flowered variety. (B. R. 1105.)

R. berberifolia (Berberis-leaved). A synonym of *R. simplicifolia*.

R. blanda (charming).* *fl.* rose-coloured, one to three; calyx tube and peduncles smooth and glaucous. May and June. *fr.* globose. *l.*, leaflets five to seven, oval or oblong, obtuse, pale on both sides and minutely downy or hoary beneath, serrated; stipules large. *h.* 1ft. to 3ft. North America. Plant nearly unarmed, or with scattered, straight, deciduous prickles. SYNS. *R. fraxinifolia* (B. R. 458), *R. Woodsii* (B. R. 976).

R. bracteata (large-bracted).* Macartney Rose. *fl.* white, large, solitary, terminal; calyx, as well as the short peduncles, densely tomentose; bracts large, surrounding the base of the calyx. July. *l.*, leaflets five to nine, obovate, slightly serrated, shining, glabrous; stipules nearly free, bristly. Branches erect, tomentose, armed with strong, recurved, often twin, prickles. *h.* 2ft. China, 1795.

R. b. scabriuscula (slightly scabrous). Branches bristly; prickles smaller than in the type, nearly straight. (B. M. 1377, under name of *R. bracteata*.)

R. Brunonii (Brown's). A synonym of *R. moschata*.

FIG. 386. ROSA CANINA.

R. canina (canine).* Dog Rose. *fl.* usually pink, sometimes solitary, or with many in a cluster; sepals usually naked, re-

Rosa—*continued.*

flexed, pinnate; styles free or nearly so, hirsute. June to August. *fr.* ovoid, urceolate, or sub-globose, the mouth of the disk conspicuous. *l.*, leaflets eglandular (rarely, except on the midrib and veins beneath), glabrous or thinly hairy, acute, very sharply toothed. Branches long, arching. *h.* 6ft. to 8ft. Europe (Britain), Orient. "Varieties innumerable: 150 are treated as species in Déséglise's 'Catalogue of the Roses of Europe and Asia.' One series of forms has erect, sub-persistent sepals, and another leaves slightly glandular beneath" (Baker). See Fig. 386.

R. carolina (Carolina). Swamp Rose. *fl.* pink, numerous, corymbose; calyx with leaf-like appendages, and, as well as the peduncles, glandular-bristly. June to September. *fr.* depressed-globular, somewhat bristly. *l.*, leaflets five to nine, elliptical, often acute, dull above, pale beneath; stipules narrow. Stems 4ft. to 7ft. high, armed with stout, hooked prickles, not bristly. North America, 1726. (L. R. 4.)

R. centifolia (hundred-leaved).* Cabbage Rose. *fl.* rose-purple, odorous, large; sepals spreading; petals inflexed; peduncles and calyx glandular-viscous. June and July. *fr.* ovate, somewhat pulpy, fragrant. *l.*, leaflets five to seven, ovate, flat, simply serrated, glandular on the margins, rather flaccid, slightly pilose beneath. Prickles scattered, nearly straight, scarcely dilated at base. *h.* 3ft. to 6ft. Orient, 1596. This species and its varieties have given rise to innumerable handsome garden Roses.

FIG. 387. ROSA CENTIFOLIA MUSCOSA.

R. c. muscosa (mossy).* Moss Rose. *fl.* rose or white; petals inflexed; peduncles and calyx glandular-mossy. *l.*, leaflets ovate, flat, simply serrated. Prickles unequal, small, numerous. See Fig. 387.

R. c. parviflora (small-flowered). *fl.* purple, smaller than in the type, solitary, very double, overtopped by the young shoots; sepals ovate, pointed. *l.*, leaflets small, stiff, ovate, acute, flat, very finely and simply toothed.

R. c. pomponia (Pompone). Pompone Rose. A dwarf form, having small flowers and leaves. See Fig. 388.

R. cinnamomea (Cinnamon-like). *fl.* pale or bright red, solitary or two or three together; sepals very narrow, longer than the concave, obcordate petals. May. *fr.* red, globose or spherical-ovate. *l.*, leaflets five to seven, oval-oblong, simply serrated, cinereous-pubescent beneath; stipules of the sterile branches linear-oblong, those of the flowering branches dilated above, with spreading auricles. Prickles twin, falcate, the larger ones subulate, the smaller ones bristly and not glandular. *h.* 6ft. Europe and North Asia.

R. c. dahurica (Dahurian). This resembles the type, but the stipules are narrow, and the prickles long and spreading.

R. c. majalis (May). Prickles of the flowering branches solitary, recurved. A small form.

R. damascena (Damascus).* Damask Rose. *fl.* white or red, large, more or less corymbose, sweet-smelling; calyx, as well as the peduncles, glandular-hispid, viscous; sepals reflexed. June and July. *fr.* ovate, pulpy. *l.*, leaflets five to seven, ovate, rather rigid, oblong in bud. Prickles numerous, unequal, dilated towards the base. *h.* 2ft. to 4ft. Orient, 1573. A parent of many beautiful garden forms.

R. d. variegata (variegated). *fl.* densely paniculate-corymbose. *l.*, leaflets somewhat round-ovate, variegated with yellow, pubescent on the margins.

Rosa—*continued.*

R. Ecæ (Mrs. Eca Aitchison's). *fl.* golden, solitary, less than 1in. in diameter. Summer. *fr.* globose, glabrous, shining, crowned by the reflexed calyx segments. *l.* small; leaflets five to nine, slightly glandular. Afghanistan. A much-branched, dwarf, very prickly shrub. (J. L. S. xix. 8.)

FIG. 388. ROSA CENTIFOLIA POMPONIA.

R. Eglanteria (Eglantine), of Linnæus. A synonym of *R. lutea.*

R. Eglanteria (Eglantine), of Miller. A synonym of *R. rubiginosa.*

R. ferox (fierce). *fl.* terminal, aggregate in twos or threes, rarely solitary; sepals pinnatifid, at length deflexed, deciduous; petals white, yellowish at base; peduncles short, glandular-hispid. June. *fr.* blood-coloured, naked, sub-globose. *l.*, leaflets five to seven, ovate or roundish-ovate, glandularly biserrate, nearly glabrous above, copiously glandular beneath. Branches erect; prickles thick, very unequal, dilated at base, hooked. North Asia. Plant dwarf and much-branched.

R. ferox (fierce), of Lawrence. A synonym of *R. rugosa.*

FIG. 389. ROSA GALLICA VAR.

R. Fortuneana (Fortune's). *fl.* white, double, about 3in. in diameter, solitary, on short, bristly peduncles; sepals ovate, undivided; petals loosely and irregularly arranged. June. *l.*, leaflets three to five, ovate-lanceolate, finely serrated, thin, bright green, shining on both sides; stipules small, subulate, deciduous. Branches slender, sparingly armed with small, falcate prickles. China, 1846. A scrambling, hybrid shrub, of which *R. indica* is one of the parents.

R. fraxinifolia (Ash-leaved). A synonym of *R. blanda.*

Rosa—*continued.*

R. gallica (French).* *fl.* varying from red to crimson, double or semi-double, erect; sepals spreading; peduncles and calyx glandular-hispid, somewhat viscous. June and July. *fr.* subglobose, very coriaceous. *l.*, leaflets five to seven, coriaceous, rigid, ovate or lanceolate, deflexed; stipules narrow, divaricate at apex. Prickles unequal. *h.* 2ft. to 3ft. Europe and Western Asia. A very variable plant. See Fig. 389. (B. M. Pl. 104.) *R. arvina* and *R. hybrida* are probably hybrids between this species and *R. repens.*

FIG. 390. ROSA NOISETTIANA.

R. g. Agatha. Agatha Rose. *fl.* purple, small, very double; sepals more or less pinnate; outer petals spreading, inner ones concave.

R. g. inermis (unarmed). *fl.* purple, double; calyx tube campanulate; sepals shortly and simply pinnate; peduncles scarcely glandular. Branches smooth, glabrous.

R. g. pumila (dwarf). *fl.* red, single; peduncles and calyx hispidulous-glandular, dark. *l.* roundish-ovate, rarely lanceolate, more or less keeled; stipules very narrow. Branches more or less prickly. (J. F. A. 198, under name of *R. pumila.*)

R. glutinosa (glutinous). *fl.* pale blush, small, solitary, on short, bristly-viscid stalks. June. *fr.* scarlet, without bracts, prickly, crowned by the hoary sepals. *l.* hoary; leaflets three to seven, flat, roundish, small, coarsely serrated, glandular and viscid; stipules much dilated upwards; petioles sparsely prickly. Prickles on old stems unequal, falcate. *h.* 2ft. Orient, 1821. (S. F. G. 482.)

R. gracilis (slender). A synonym of *R. involuta Sabini.*

R. gymnocarpa (naked-fruited). *fl.* red, remarkably small, solitary or sometimes in pairs; calyx segments ovate, simply acuminate, deciduous. June. *fr.* red, the size of a small pea, smooth, and naked. *l.*, leaflets five to nine, glabrous, rather distant, oval, sharply and doubly glandularly serrated. Branches glabrous, furnished with scattered, weak prickles. *h.* 1ft. to 4ft. California.

R. Hackeliana (Hackel's). *fl.* pink, minute, solitary, very shortly pedunculate; sepals undivided or pinnatifid. June. *fr.* ovate-spherical, glandular-bristly. *l.*, leaflets five to seven, small, somewhat elliptic-orbicular, obtuse, simply serrulated, tomentose on both sides, densely so beneath; stipules ovate-oblong, dilated. Prickles nearly straight or often hooked and dilated at base. South Europe. A dwarf species.

R. hemisphærica (hemispherical).* *fl.* yellow, solitary, shortly pedunculate; calyx tube hemispherical; sepals lanceolate, almost undivided; petals obovate. July. *fr.* erect, globose. *l.*, leaflets five to seven, obovate, paler beneath and pubescent on the nerves, somewhat biserrate; petioles, as well as the peduncles, slightly spiny. *h.* 3ft. Orient, 1629. SYN. *R. sulphurea* (B. R. 46).

R. hibernica (Irish). *fl.* pale pink, few or many; sepals leafy, persistent; peduncles naked. June and July. *fr.* erect, globose, naked. *l.*, leaflets simply serrated, glaucous-green above, thinly hairy on the nerves beneath; petioles pubescent; stipules nearly naked on the back, the auricles gland-ciliated. Branches short; prickles rather crowded, gradually passing into bristles. *h.* 2ft. Britain. (Sy. En. B. 463.) Perhaps a hybrid between *R. canina* and *R. spinosissima.* In the variety *cordifolia* the peduncles are bristly and glandular, while in *glabra* they are naked.

Rosa—*continued.*

R. hispida (hispid). *fl.* white, with a faint tinge of yellow, solitary; sepals lanceolate, cuspidate; petals oval, very obtuse; peduncles thickened at apex. June. *fr.* black, large, globose, glabrous. *l.*, leaflets seven, oval, serrated with acuminate teeth, glabrous; petioles unarmed. Branchlets hispid-prickly. *h.* 3ft. 1780. A garden plant. (B. M. 1570.) SYN. *R. lutescens* (L. R. 9).

R. humilis (dwarf). *fl.* pale blush, usually in pairs; sepals ovate, with a narrow point, their edges cottony; bracts pointed, somewhat hairy. June to August. *l.*, leaflets usually five, somewhat shining, lanceolate, acuminate, finely toothed; stipules naked, very narrow. Branches slender, reddish-brown, armed with a pair of needle-shaped prickles under the stipules. North America. A low, weak, spreading species.

R. hystrix (bristly). A variety of *R. sinica.*

R. indica (Indian).* Blush, Common China, or Monthly Rose. *fl.* red, very numerous, usually semi-double; calyx tube naked; sepals nearly simple, acuminate, deciduous, glandular outside; petals obcordate, concave. All seasons. *fr.* scarlet, obovate. *l.* shining, without pubescence; leaflets three to five, even, elliptic, acuminate, nearly simply crenate-serrate, dark green above, glaucous beneath; petioles rough with bristles and little, hooked prickles; stipules very narrow, subulate. Branches stout, armed with brown, hooked prickles. *h.* 4ft. to 20ft. Native country not clearly known. 1789. *R. borbonica* is probably a hybrid between *R. indica* and *R. gallica*; *R. Noisettiana* (see Fig. 390) and *R. Ternauxiana*, between *R. indica* and *R. moschata*; *R. reclinata*, between *R. indica* and *R. alpina*; *R. ruga*, between *R. i. fragrans* and *R. repens*; and *R. Fortuneana*, of Lemaire (L. J. F. 361), is doubtless also a hybrid of which *R. indica* is one of the parents.

R. i. anemonæflora (Anemone-flowered). *fl.*, calyx highly glabrous. *l.*, leaflets ovate-lanceolate, argutely serrated.

R. i. caryophylla (Clove-leaved). *fl.* rose, sub-paniculate; petals cucullately inflexed. *l.*, leaflets ample, slender.

FIG. 391. FLOWERING BRANCHLET OF ROSA INDICA FLORE-PLENO.

R. i. flore-pleno (double-flowered). This only differs from the type in having double flowers. See Fig. 391. There are a large number of garden varieties in cultivation.

R. i. fragrans (fragrant). Sweet-scented Chinese Rose. *fl.* rose-coloured, semi-double, fragrant; peduncles thickened. *fr.* ovate. *l.*, leaflets three to five, ample; stipules fringed or entire. Stem firm; prickles strong.

R. i. longifolia (long-leaved). *fl.* rose, almost single; peduncles rather rough. *l.*, leaflets three to five, long-lanceolate. Stems firm, nearly unarmed.

R. i. minima (smallest).* *fl.*, petals obovate, acuminate. *l.*, leaflets ovate, obtuse, purplish. Stem and branches prickly and bristly, or nearly glabrous. (B. M. 1762, under name of *R. semperflorens minima.*) SYN. *R. Lawrenceana* (B. R. 538). There are double-flowered forms of this which now generally pass under the name of "Fairy Rose."

R. i. semperflorens (ever-flowering). *fl.* purple, on filiform peduncles; sepals elongated, sub-appendiculate. *l.*, leaflets

Rosa—*continued.*

slender, lanceolate or ovate. Stem and branches slender and weak, prickly or unarmed. (B. M. 284, under name of *R. semperflorens*; S. E. B. 91, under name of *R. indica.*)

R. involucrata (large-involucred). *fl.* white, fragrant, 2in. to 3in. in diameter, solitary or shortly corymbose, rarely axillary and longer pedicelled; calyx tube unarmed; petals retuse; bracts large, lanceolate. July. *fr.* globose, densely tomentose. *l.* 3in. to 4in. long; leaflets three or four pairs, 1½in. long or less, elliptic or oblong, acute or acuminate, finely serrated; stipules small, laciniate. Branchlets and inflorescence densely tomentose; prickles straight, often in stipular pairs. *h.* 3ft. India, 1818. (B. R. 739; L. R. 1, under name of *R. Lyelli.*)

R. involuta (involute). *fl.* white or pink; sepals leafy, persistent, densely glandular on the back; peduncles densely bristly. June and July. *fr.* red, globose, sparingly produced. *l.*, leaflets doubly serrated, glabrous or pubescent and glandular beneath; petioles and stipules densely glandular and ciliated. Branches sometimes arching; prickles scarcely curved, crowded, gradually passing into bristles. *h.* 2ft. Europe (principally Britain). A very variable species, of which there are many distinct forms. The following may be mentioned:

R. i. Sabini (Sabin's). *fl.*, calyx tube sub-globose, more or less bristly; sepals pinnate. *fr.* sub-globose. *l.*, leaflets with copious, compound serratures, thinly pubescent above; petioles (and peduncles) densely hairy, glandular, and bristly. Prickles straight, ¼in. long. This is the commonest form of the species. SYN. *R. gracilis.*

R. i. Wilsoni (Wilson's). *fl.*, calyx tube almost glabrous; sepals nearly simple. *fr.* sub-obovoid. *l.*, leaflets often cordate, terminal, large, glabrous above, the ribs thinly hairy and nearly glandless beneath, the serratures simple. Prickles as in *R. i. Sabini.* (Sy. En. B. 464.)

R. lævigata (smooth). A synonym of *R. sinica.*

R. Lawrenceana (Lawrence's). A synonym of *R. indica minima.*

R. laxa (loose). *fl.* solitary; calyx tube roundish, hairy, sometimes underset with floral leaves; sepals entire, silky; petals white, yellowish at base, somewhat cordate; peduncles very short, hairy. July. *fr.* roundish. *l.* pendent; leaflets oblong-elliptic, doubly serrated, shining above, hairy beneath; petioles glandular-hairy, somewhat prickly; stipules fringed. Branches slender, silky-hairy; prickles stipular, in pairs. *h.* 3ft. Siberia.

R. lucida (clear).* *fl.* red; calyx lobes glandular-bristly; peduncles one to three-flowered. May to July. *fr.* depressed-globular, smooth when ripe. *l.*, leaflets five to nine, elliptic or oblong-lanceolate, shining above, sharply serrated. Stems 1ft. to 2ft. high, armed with unequal, bristly prickles, which are mostly deciduous, the stouter, persistent ones nearly straight, slender. North America, 1724.

R. l. flore-pleno (double-flowered).* A charming variety, with double flowers, met with in nursery catalogues under the name of "Rose Button."

R. lutea (yellow).* Austrian Briar. *fl.* yellow, few, 2in. to 2½in. in diameter; calyx tube hemispherical or globose, glabrous, unarmed or prickly; sepals long-acuminate, entire or with marginal laciniæ; petals obcordate. June. *l.* 1½in. to 3in. long; leaflets two to four pairs, petiolulate, elliptic-ovate or orbicular, obtuse or apiculate, deeply or doubly glandular-serrate; petioles glandular-pubescent; stipules broad. Branches with straight prickles, erect. *h.* 3ft. Orient. (B. M. 363, under name of *R. l. unicolor.*) SYN. *R. Eglanteria.*

R. l. punicea (scarlet). *fl.*, petals scarlet above, and yellow beneath; stigmas purple. (B. M. 1077, under name of *R. l. bicolor.*)

R. lutescens (yellowish). A synonym of *R. hispida.*

R. macrophylla (large-leaved). *fl.* bright red, solitary or corymbose, 1in. to 3½in. in diameter; calyx tube ½in. to 1½in. long; sepals 1in. to 2in. long, persistent; petals broadly obcordate; peduncles, pedicels, and calyx usually very bristly and glandular. June. *fr.* sometimes 2in. long. *l.* 2in. to 8in. long; leaflets elliptic-ovate, acuminate or acute, finely serrated, usually pubescent beneath; petioles pubescent; stipules large, sheathing. Prickles straight or slightly curved, or absent. *h.* 6ft. Temperate Himalaya and China.

R. micrantha (small-flowered). *fl.* pale red, 1in. in diameter; sepals deciduous, densely glandular, with a leafy point and one or two leaflets. June. *fr.* scarlet, urceolate. *l.*, leaflets small, more pointed than those of *R. rubiginosa*, glabrous above, densely glandular beneath. Branches long, arched; prickles equal. *h.* 4ft. Europe (Britain).

R. microcarpa (small-fruited). *fl.* white, small, very numerous, corymbose; bracts deciduous; stalks smooth. July. *fr.* scarlet, the size and form of those of *Cratægus Oxyacantha.* *l.* distant; leaflets three or five, oblong or ovate-lanceolate, naked, simply crenate-serrate, dark shining green above, paler beneath; petioles downy or naked; stipules subulate. Branches slender, flagelliform, with a few hooked prickles. *h.* 10ft. China, 1822. Climber. (B. M. 6548; L. R. 18.)

R. microphylla (small-leaved). *fl.* of a delicate blush-colour, small. August to October. *fr.* prickly, green or yellowish when ripe. *l.*, leaflets ovate, small; bracts appressed, pectinate. *h.* 2ft. to 4ft. China. (B. M. 6549.) This species connects the

Rosa—*continued.*

Bracteatæ and the *Cinnamomeæ.* There is a double-flowered form in cultivation.

R. mollis (soft). *fl.* red; sepals persistent, densely glandular. June and July. *fr.* globose or turbinate, densely prickly, rarely naked, ripening early. *l.*, leaflets very hairy, doubly serrate. Branches erect; prickles uniform, scattered, slender, nearly straight. North Europe (Britain). Allied to *R. spinosissima.* SYN. *R. mollissima* (Sy. En. B. 466).

R. m. pomifera (Apple-bearing).* *fl.*, sepals copiously pinnate, quite persistent; petals often ciliated and glandular. *fr.* more or less pear-shaped, scarlet, large, very handsome, ripening early in autumn. Branches arching. (G. C. n. s., xxv. 237, under name of *R. pomifera.*)

R. mollissima (very soft). A synonym of *R. mollis.*

R. montana (mountain-loving). *fl.* varying from whitish to rose, generally solitary on short, erect peduncles. Summer. *fr.* deep red, globular or oblong, glandular-prickly. *l.* doubly dentate, with five to seven rounded leaflets, glabrous above, hairy beneath. Prickles scattered, nearly straight, thin. *h.* 6ft. South Europe, &c.

R. moschata (musky).* *fl.* yellowish-white, 1½in. to 2in. in diameter, very numerous, in compound corymbs; calyx tube small, obovoid; sepals ½in. long, often pinnatifid; petals orbicular-obovate; inflorescence pubescent. August. *fr.* dark brown, ½in. in diameter. *l.* 2in. to 6in. long; leaflets two to four pairs, ovate or ovate-lanceolate, acute or acuminate, with very numerous and acute serratures, puberulous beneath. Prickles scattered, stout, recurved. *h.* 12ft. South Europe to India, 1590. Climber. (B. R. 829, 861.) SYN. *R. Brunonii* (B. M. 4030; F. d. S. 366-7).

R. multiflora (many-flowered).* *fl.* white, pink, or purple, corymbose, often very numerous; sepals short, ovate, entire, not persistent. June. *fr.* bright red. *l.*, leaflets five to seven, ovate-lanceolate, soft, slightly wrinkled; stipules pectinate. Branches, as well as the peduncles and calyx, tomentose; prickles slender, scattered. *h.* 12ft. China and Japan, 1822.

R. m. carnea (flesh-coloured). *fl.* pink, double. (B. M. 1059; B. R. 425.)

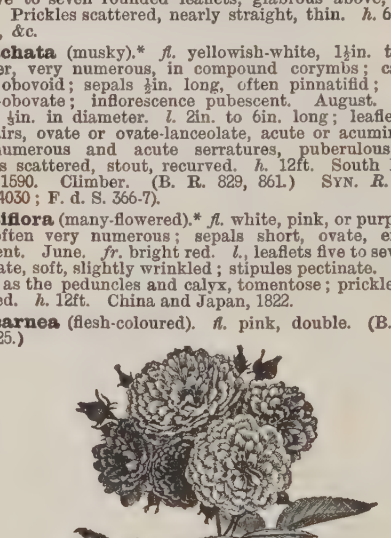


FIG. 392. FLOWERING BRANCHLET OF ROSA MULTIFLORA FLORE-PLENO.

R. m. flore-pleno (double-flowered). This only differs from the type in having the flowers double. See Fig. 392.

R. m. platyphylla (broad-leaved). *fl.* purple, large, double. *l.*, leaflets broader than in the type. (B. R. 1372.)

R. nitida (shining).* *fl.* of a brilliant red, on bristly stalks; sepals very narrow; petals obcordate, concave, nearly erect; cymes one or few-flowered. July. *fr.* bright scarlet, depressed-spherical, somewhat hispid. *l.* very shining dark green, changing to purple in autumn; leaflets three to seven, narrow-lanceolate, naked, simply serrated; petioles slender, naked; stipules gland-fringed. Branches erect, much divided, covered all over with prickles and bristles. *h.* 2ft. North America, 1807. (L. R. 2.)

R. nutkana (Nootka Sound). *fl.* varying from pale to bright red; calyx segments entire, long-acuminate, glandular without, spathulate at apex; peduncles solitary, glabrous. June. *fr.* ovate, glabrous. *l.*, leaflets ovate-elliptic, obtuse, obsoletely glandular-serrated, pubescent at the midrib below; petioles prickly. Branches glabrous; prickles stipular. *h.* 6ft. Nootka Sound.

R. orientalis (Eastern). *fl.* solitary, shortly pedunculate; sepals straight, undivided or pinnatifid. June. *fr.* spherical or ovate, densely bristly, rarely glabrous. *l.*, leaflets five to seven, nearly

Rosa—*continued.*

round or elliptic-ovate, almost simply serrated, greyish-tomentose on both sides. Prickles all subulate, nearly straight, unequal. Orient. A dwarf species.

R. phœnicia (Phœnician). *fl.* white, disposed in a compound, corymbose panicle; calyx tube highly glabrous; sepals undivided or minutely lobulate; petals longer than the calyx. June. *l.*, leaflets three or five, ovate-elliptic, obtuse, deeply and simply serrated, opaque above, hairy or pilose and paler beneath. Branches elongated, climbing; prickles scattered, hooked. Orient.

R. pimpinellifolia (Pimpernel-leaved). A synonym of *R. spinosissima.*

R. pisocarpa (Pea-fruited). *fl.* 1in. in diameter, solitary or in few-flowered corymbs; calyx glandular, with very long lobes; petals rose-coloured, orbicular, bifid; stamens very numerous. July. *fr.* bright red, globose, erect, ¼in. to ½in. in diameter. *l.* 2in. to 3in. long; leaflets four to seven, ⅔in. long, broadly elliptic, obtuse, finely serrated; petiole and rachis minutely pubescent. California, 1877. A straggling, much-branched, unarmed or spiny bush. (B. M. 6857; G. M., Oct. 9, 1886.)

R. repens (creeping). *fl.* white, with a yellow eye, one to six, rarely solitary, scentless; calyx purple; sepals deciduous, naked at back, short, broad. June and July. *fr.* small, naked, subglobose. *l.*, leaflets quite glabrous, glaucous beneath. Branches trailing, purple, glaucous; prickles uniform, stout, strongly hooked, often very large. *h.* 2ft. to 8ft. Europe (Britain). SYN. *R. arvensis. R. bibracteata* is a variety with larger leaflets and stronger shoots.

R. r. capreolata (tendrilled). Ayrshire Rose. *fl.* on glandular-hispid or rugose peduncles. *l.*, leaflets ovate, argutely serrated, slender. Prickles slender, very acute.

R. rubella (reddish). *fl.* pale or deep red, solitary, without bracts; sepals erect, entire, rough; petals concave, emarginate; peduncles hispid. June. *fr.* scarlet, pendulous, long-ovate. *l.*, leaflets seven to eleven, almost flat, oval, pointed, simply serrated or nearly so, dark green above, paler beneath; petioles sparingly glandular, without hairs; stipules dilated towards their ends. Branches erect, reddish, 5ft. to 4ft. high, bristly and prickly. Europe. This and its varieties, *gentilis, reversa,* and *stricta,* are probably hybrids between *R. alpina* and *R. spinosissima.*

R. rubiginosa (rusty-leaved).* Eglantine; Sweetbriar. *fl.* pink, one to three; sepals densely glandular, pinnate, sub-persistent. June. *fr.* globose. *l.*, leaflets glabrous above, pubescent beneath. Branches compact; prickles with a few bristles and glandular hairs intermixed. *h.* 5ft. Europe (Britain). Plant very sweet-scented. SYN. *R. Eglanteria. R. permixta* and *R. sylvicola* are mere varieties of this species.

R. rubrifolia (red-leaved). *fl.* deep red, small; sepals very narrow, longer than the petals. August. *fr.* oblong, with very tender flesh. *l.*, leaflets ovate, toothed, tinged with red, very glaucous, wrinkled, opaque. Stems deep red or purple, covered with pale bloom and armed with small, short, pale, hooked prickles. *h.* 6ft. Europe. Otherwise like *R. canina.*

R. r. fenestralis (fenestrate). A synonym of *R. setigera.*

R. r. lævis (smooth). *fl.*, sepals entire. *fr.* corymbose, and, as well as the peduncles, smooth. (B. R. 430, under name of *R. rubrifolia.*)

R. rugosa (wrinkled).* *fl.* red, large, solitary, bractless; sepals reflexed, hairy, entire, very narrow; petals emarginate; peduncles beset with straight, short, scattered prickles. June. *fr.* varying from orange-red to deep red, very large and showy, depressed-globose, pendulous, crowned by persistent, erect sepals; ripening in autumn. *l.*, leaflets five to nine, ovate, much wrinkled, simply serrated, obtuse. Branches slender, armed with very dense, straight, nearly equal prickles. *h.* 4ft. Japan, 1845. (L. R. 19.) SYN. *R. ferox* (B. R. 420). *R. Iwara* is supposed to be a hybrid between this and *R. multiflora.*

R. r. kamtschatica (Kamtschatkan). *fl.*, petals obcordate, sometimes apiculate; bracts elliptical, nearly naked. *l.* grey; leaflets obovate, blunt, with callous teeth. Branches downy, pale brown, procumbent. Prickles under the stipules large and spreading, two or three together; intermediate ones much smaller.

R. r. nitens (shining). *l.* pale shining green, highly glabrous on both sides. (B. R. 824, under name of *R. kamtschatica nitens.*)

R. sempervirens (evergreen).* *fl.* white, fragrant, very numerous; sepals nearly simple; peduncles usually glandular-hispid. June to August. *fr.* orange, small, usually glandular-hispid. *l.* persistent; leaflets ovate-lanceolate, simply serrated, smooth on both surfaces, paler beneath. South Europe and India, 1529. Climber. (B. R. 459.) The following are varieties:

R. s. Leschenaultiana (Leschenault's). *fl.*, peduncles beset with glandular bristles. *l.*, leaflets ovate-lanceolate; petioles and stems prickly, pruinose and violaceous. Stems climbing 60ft. to 70ft.

R. s. prostrata (prostrate). *fl.* white or pale red, solitary or numerous; peduncles sometimes furnished with two or many bracts. Stems prostrate.

R. s. scandens (climbing). Peduncles and fruit slightly hispid.

R. sepium (hedge). *fl.* pink; sepals sub-persistent; styles pubescent; peduncles naked. June. *fr.* ovoid, naked. *l.*, leaflets

Rosa—*continued.*

small, narrowed to both ends, glabrous, but densely glandular beneath. Prickles with a few bristles and glandular hairs intermixed. *h.* 3ft. Europe (Britain). Plant looser in habit than *R. rubiginosa,* which it somewhat resembles.

R. sericea (silky). *fl.* white, rarely pink or pale straw-coloured, solitary, ebracteate, 2in. to 2½in. in diameter, almost axillary; calyx tube and peduncles bristly and glandular; sepals pubescent, persistent; petals obcordate, usually four. May. *l.* 1in. to 3in. long, crowded; leaflets seven to nine, usually oblong, obtuse, acutely toothed, silky beneath. Branches perfectly glabrous and unarmed or prickly only, or also loosely or densely bristly and glandular. India, 1822. Plant erect or sub-scandent. (B. M. 5200; L. R. 12.)

R. setigera (bristle-bearing). Climbing or Prairie Rose. *fl.* deep rose-coloured, changing to white, corymbose; calyx and peduncles glandular. July. *fr.* globular. *l.*, leaflets three to five, ovate, acute, sharply serrated, smooth or downy beneath. Stems climbing, armed with stout, nearly straight prickles, not bristly; strong shoots growing 10ft. to 20ft. in a season. North America. Climber. SYN. *R. rubrifolia fenestralis* (L. R. 15).

R. simplicifolia (simple-leaved). *fl.* sweet-scented, solitary, without bracts; calyx tube downy, covered with needle-shaped prickles; sepals entire; petals deep yellow, with a dark crimson spot at their base. June. *fr.* pale green, depressed-globose. *l.* sessile, erect, simple, narrow-obovate, densely pubescent; stipules absent. Branches slender, pubescent, bristly; prickles slender, falcate. *h.* 2ft. to 3ft. Siberia and Persia, 1790. (G. C. n. s., xxiv. 468.) SYNS. *R. berberifolia, Hultheimia berberifolia, Lowea berberifolia* (B. R. 1261). *R. Hardii* (G. C. n. s., xxiv. 469) is a hybrid between this species and *R. involucrata.*

R. sinica (Chinese).* Cherokee Rose. *fl.* white, large, solitary; calyx very bristly; sepals rigid, spreading. June. *fr.* orange-red, muricate. *l.* evergreen, mostly trifoliolate; leaflets smooth and shining, hispid on the midrib. Stem long, trailing, smooth, the branches armed with very stout, curved prickles. China (naturalised in Southern United States, West Indian Islands, &c.), 1759. (B. M. 2847; B. R. 1922; L. R. 16.) SYN. *R. lævigata.*

R. s. hystrix (bristly). *fr.* purple, very brittle. *l.* distant. Branches covered with little, short, stiff bristles, a few large, falcate prickles being mixed among them. (L. R. 17, under name of *R. hystrix.*)

R. spinosissima (very spiny).* Burnet or Scotch Rose. *fl.* white or pink, 1in. to 1½in. in diameter, one to three or more together; calyx tube usually glabrous; sepals simple, more or less persistent. May and June. *fr.* short. *l.* small, slightly or not glandular; leaflets seven to nine, singly or doubly serrated, usually broad. Prickles crowded, very unequal, nearly straight, passing into stiff bristles and glandular hairs. *h.* 1ft. to 4ft. Europe (Britain), Siberia. (Sy. En. B. 461.) SYN. *R. pimpinellifolia.*

R. s. altaica (Altaic). *fl.*, calyx and peduncles smooth. *l.* broader than in the type. Plant taller. (B. R. 888, under name of *R. grandiflora.*)

R. s. argentea (silvery). *fl.* white, semi-double; calyx and peduncles purple, hispidulous. *l.*, leaflets ovate, white-tomentose beneath. Stems and branches hispid, prickly, intermixed with minute bristles. (B. M. 1570, under name of *R. hispida argentea.*)

R. s. myriacantha (many-spined). *fl.*, calyx and peduncles hispid. *l.*, leaflets minute, doubly-serrated. Prickles very numerous, the lower ones often reversed. (L. R. 10, under name of *R. myriacantha.*)

R. s. reversa (reversed). *fl.* yellowish-white. Stems clothed below with very slender, deflexed prickles. (B. M. 431.)

R. stylosa (large-styled). *fl.*, sepals reflexed, much pinnate; styles as long as, or shorter than, the stamens; peduncles elongated, more or less bristly and glandular. *l.*, leaflets pubescent beneath. A tall, rarely low bush. To this species, which is intermediate between *R. canina* and *R. repens,* the following varieties are referred: *fastigiata, gallicoides, Monsoniæ, opaca, systyla.*

R. sulphurea (sulphur-coloured). A synonym of *R. hemisphærica.*

R. tomentosa (tomentose). *fl.* bright rose-pink, sometimes pure white, generally one to three; calyx tube prickly or naked; sepals copiously pinnate, not quite persistent. June and July. *fr.* ovate-urceolate or sometimes turbinate. *l.* 4in. to 5in. long; leaflets copiously duplicate-serrate (rarely simply-serrate), thinly grey-downy above, more so below. Branches elongated, arching; prickles scattered, equal, straight or nearly so, slender. *h.* 6ft. Europe (Britain). (Sy. En. B. 467.) Of this species there are numerous varieties.

R. turbinata (top-shaped). *fl.* reddish-violet, ample, sub-corymbose; calyx turbinate, nearly smooth; sepals undivided, subspathulate; peduncles rugulose-hispid. June. *l.*, leaflets five to seven, ovate-cordate, bullate-wrinkled, ample, simply serrated, approximate, slightly villous beneath; stipules large, amplexicaul. Stems almost unarmed; branches smooth. *h.* 5ft. 1629. Of garden origin: perhaps a hybrid between *R. canina* and *R. gallica.*

R. Webbiana (Webb's). *fl.* pink, 1in. to 3in. in diameter, usually solitary; calyx often densely bristly, sometimes quite

Rosa—*continued.*

smooth; sepals persistent, caudate-acuminate, exceeding the obcordate petals. June. *fr.* ovoid or globose, ¼in. to 1in. in diameter. *l.* ½in. to 2in. long; leaflets two to five pairs, oblong or orbicular, rarely obovate, entire towards the usually rounded base; stipules small. Prickles copious, erect, straight or curved. *h.* 2ft. to 5ft. Inner Himalaya.

R. Woodsii (Woods'). A synonym of *R. blanda.*

VARIETIES. These are almost innumerable, particularly in the Hybrid Perpetual class, which is so well known and so justly popular with all cultivators, either for exhibition purposes, culture in pots, or for garden decoration, &c. The beautiful varieties of Tea, Hybrid Tea, and Noisette Roses are best adapted for culture under glass, where their extremely delicate flowers are unsurpassed; if placed in the open air, the plants require a warm position, and protection in winter. The other classes referred to below are mostly what are known as Garden Roses, because they are not generally used for exhibition, but for climbing and for other decorative garden purposes.

Hybrid Perpetual Roses.

The subjoined selection of varieties from this class, although somewhat long, contains only a portion of such as are alike worthy of being included, but which have necessarily to be omitted. They are nearly all of vigorous-growing habit under liberal treatment, therefore no reference is made on this point to each individually.

ABEL CARRIÈRE, maroon, shaded scarlet; large, full, good form. ABEL GRAND, silvery-rose, glossy and clear; very sweet-scented. ALFRED COLOMB, bright fiery-red; large, full, and of fine globular form; fragrant and superb. ALFRED K. WILLIAMS, carmine-red; large, full, and perfect form; grand exhibition flower. ANNIE LAXTON, beautiful rose-colour; large, full, and good form. AUGUSTE RIGOTARD, cherry-red; large, full, fine foliage; free-flowering. BARONESS ROTHSCHILD, delicate pink, suffused with white; very large and fine, but scentless. BEAUTY OF WALTHAM, bright rosy-crimson; medium size, full, fragrant. CAMILLE BERNARDIN, beautiful pale crimson, with lilac shade; large, full, and fine form, very sweet; superb. CAPTAIN CHRISTY, very soft flesh-colour, deeper centre; very large; fine in autumn. CENTIFOLIA ROSEA, bright rose; large but rather thin, having the scent of the Cabbage Rose. CHARLES DARWIN, deep crimson, with brownish tint, and slightly shaded with violet; a good autumnal blossomer, and thoroughly distinct. COMTESSE DE SERENYE, delicate rose, large; best in dry seasons. COUNTESS OF OXFORD, bright carmine, shaded purple; very large and full; a reliable variety. COUNTESS OF ROSEBERY, carmine-rose; smooth, beautifully cupped; free-flowering. DEVIENNE LAMY, carmine-red; large, full, and fine, globular form. DR. ANDRY, brilliant red; large and full, good form. DUCHESSE DE CAYLUS, brilliant carmine-red; a large, fine flower of great substance, perfect form; thorough perpetual. DUCHESSE DE VALLOMBROSA, soft rose, with bright pink centre, passing to rosy-white; large, full. DUCHESS OF BEDFORD, rich velvety-crimson, suffused with scarlet; petals reflexed. DUCHESS OF CONNAUGHT (Noble), bright crimson, shaded with brownish-crimson; medium size, globular. DUKE OF EDINBURGH, fine vermilion; large, full, and good form; superb. DUKE OF TECK, crimson-scarlet; large, full, and good form; very free-flowering. DUKE OF WELLINGTON, bright crimson; medium size, full, and perfect form. DUPUY JAMAIN, bright cerise, large; fine in autumn. EDOUARD MORREN, deep rose; large, and very double. ETIENNE LEVET, carmine; large, full, and exquisitely formed; a good show flower. FISHER HOLMES, deep rich crimson; full and good form. FRANÇOIS MICHELON, beautiful rich rose; reverse of petals silvery; large, full, and of fine form. GÉNÉRAL JACQUEMINOT, brilliant crimson-scarlet; an abundant blossomer and very fragrant. HARRISON WEIR, rich velvety-crimson, enlivened with scarlet; large, full, and stout in texture; fragrant. HEINRICH SCHULTHEIS, delicate pinkish-rose; large, full, and fine form, very sweet-scented; a thorough perpetual. HENRY BENNETT, fiery-red, shaded carmine; large and good form, very showy. HER MAJESTY (Bennett), rich delicate rose, similar in shade to BARONESS ROTHSCHILD; the flowers are fully 6in. across, and of great substance; an extremely large and fine new variety. HORACE VERNET, velvety-crimson, shaded with purple; extra fine. JEAN LIABAUD, velvety-crimson, shaded black, very large; a fine dark Rose. JOHN HOPPER, deep rose; back of petals lilac tint; very large and double, good form. JOHN STUART MILL, bright clear red; large, full, and beautiful form; a good variety for general cultivation. JULES MARGOTTIN, bright rose; large and full. LA FRANCE, silvery-white, back of petals rose; an abundant blossomer and highly fragrant; superb. LORD MACAULAY, bright velvety-crimson; medium size, full, and good form. LOUIS VAN HOUTTE, reddish-scarlet and amaranth, shaded with bluish-purple; large, full; a grand dark Rose. MADAME

Rosa—*continued.*

GABRIEL LUIZET, pale pink; large, full, finely cupped, fragrant. MADAME LACHARME, white, the centre sometimes shaded with light rose in opening, large; good habit, free-flowering. MADAME NAUCHURY, fine satin-like rose, with a soft lavender shade. MADAME VICTOR VERDIER, brilliant cherry-red; large and finely cupped; extra fine. MAGNA CHARTA, bright pink, suffused with carmine; large and full. MARGUERITE DE ST. AMAND, pale pink; large, full, and fine form; superb. MARIE BAUMANN, vivid red; large, full, and fragrant; superb. MARIE RADY, deep red; very large, full, and imbricated. MARQUISE DE CASTELLANE, beautiful bright rose, very large; a fine, bold flower. MAURICE BERNARDIN, beautiful rich crimson, shaded with violet; large, double, fragrant. MDLLE. THÉRÈSE LEVET, delicate pink. MERVEILLE DE LYON, white, with a slight tinge of satiny-rose; large, and of excellent form; a superb variety; extra fine. MONSIEUR BONCENNE, blackish-velvety-purple; large, full, and good form. MONSIEUR E. Y. TEAS, deep cherry-red; large and full, very fragrant; superb. MRS. HARRY TURNER, dazzling crimson-scarlet, with rich maroon shading. MRS. JOWITT, brilliant crimson, shaded with lake; flowers very large and double. OXONIAN, beautiful shaded rose, of good substance; very sweet. PAUL NERON, deep rose, exceedingly large and full; good habit. PIERRE NOTTING, blackish-red, slightly purpled; very large, of exquisite form, very fragrant. PRINCE ARTHUR, rich scarlet, shaded crimson; large, nearly full, good form; an abundant blossomer. PRINCE CAMILLE DE ROHAN, velvety-crimson-maroon, shaded with blood-red; large, and full; very fine. PRINCESS BEATRICE, rosy-pink; large, full, and fine globular form. QUEEN OF QUEENS, pink, with blush edges in summer, altogether pink in autumn; large, full, and double; free-flowering. REYNOLDS HOLE, deep maroon, flushed over with scarlet, distinct, large; a fine dark Rose. SENATEUR VAISSE, scarlet-crimson; beautiful shape, large, free-flowering, and highly fragrant. STAR OF WALTHAM, rosy-crimson, very rich and effective; large, full, and good form. SULTAN OF ZANZIBAR, blackish-maroon, edged with scarlet, medium size; a bright dark variety. ULRICH BRUNNER, lively carmine-rose; large, nearly full; very showy and good. VICTOR VERDIER, rose, shaded with carmine; full. XAVIER OLIBO, dark velvety-crimson; large and full; one of the finest dark Roses.

Tea-Scented Roses.

ADAM, pale blush-rose, large and double; fine. ALINE SISLEY, purple-rose, good form; free. ANNA OLLIVIER, rosy-flesh; base of petals darker; full, and good form. BELLE LYONNAISE, pale lemon; large, full, and fine form; a seedling from GLOIRE DE DIJON, quite distinct in colour. CATHERINE MERMET, fine fleshy-rose; large, full and perfect, imbricated; superb. COMTESSE DE NADAILLAC, bright rosy-flesh; base of petals coppery-yellow; distinct. DEVONIENSIS, creamy-white, large and full; a fine old Rose. DEVONIENSIS, CLIMBING, flowers same as old variety; of very vigorous habit. DUCHESS OF EDINBURGH, deep glowing crimson; large and full. ETOILE DE LYON, deep yellow; large and very double, full. GLOIRE DE DIJON, fawn, shaded with salmon; very large, good form; a splendid and well-known Rose for all purposes, blossoms well late in the season. GOUBAULT, bright rose, deeper centre. HOMER, blush, edged with deep rose. INNOCENTE PIROLA, creamy-white, exquisite form; very free. ISABELLA SPRUNT, sulphur-yellow, medium size; an abundant blossomer, beautiful in bud. JEAN DUCHER, salmon-yellow, centre peach; large, full, and good form. JEAN PERNET, bright yellow, medium size. LA BOULE D'OR, pale yellow, deeper centre; large and very double; does not open freely. MADAME BÉRARD, salmon-yellow; back of petals clear rose; large and full, fine form; free-flowering. MADAME BRAVY, white, centre flushed with pink; large, double, finely formed. MADAME CAMILLE, delicate salmon-pink; large, full, and fine form. MADAME DE WATTEVILLE, white, slightly shaded salmon; large, well-shaped, remarkable in colour. MADAME FALCOT, bright buff-yellow; fine. MADAME HIPPOLYTE JAMAIN, white, with yellow centre, tinted with soft rose; fine form, large and full. MADAME LAMBARD, beautiful bright red early in the season, paler in autumn; base of petals coppery-yellow; large, full, and good form; very beautiful. MADAME MARGOTTIN, beautiful citron-yellow, deeper centre, perfect form; fine. MADAME TRIFLE, salmon-yellow; outer petals sometimes deep coppery-yellow; large and full; a seedling from GLOIRE DE DIJON. MADAME WILLERMOZ, white, cream centre; very fine. MARIE DUCHER, transparent rose; very large, full, fine form; good habit. MARIE VAN HOUTTE, lemon-yellow, edged with lively rose; medium size, good form; superb. NARCISSE, sulphur-yellow, deeper centre. NIPHETOS, purest white; large and double. PERFECTION DE MONTPLAISIR, canary-yellow, medium size; free-flowering. PERLE DES JARDINS, bright orange-yellow; large, full, and good form. RUBENS, white, shaded with rose, centre peach; large and full, good form. SAFRANO, fawn-colour; beautiful in bud. SOMBREUIL, pale lemon; large and very double. SOUVENIR D'ELISE VARDON, flesh-white, shaded with salmon; beautiful form, large and full; tender. SOUVENIR DE MADAME PERNET, fine light rose, shaded clear yellow; very large. SOUVENIR DE M. PAUL NERON, white, delicately edged and tinted with pale rose; medium size, full. SOUVENIR D'UN AMI, deep rose; large and full, good form. SUNSET, deep orange-yellow; medium size, full; between MADAME FALCOT and PERLE DES JARDINS; superb. VICOMTESSE DE CAZES, yellow, centre coppery-yellow; a distinct and beautiful, but rather tender variety.

Rosa—*continued.*

Hybrid Tea Roses.

BEAUTY OF STAPLEFORD, pink-rose, shaded centre; large. BEDFORD BELLE, blush-white, tinted rose. CHESHUNT HYBRID, cherry-carmine, large and full; a good pillar Rose. COUNTESS OF PEMBROKE, satin-rose, highly perfumed; fine form. HON. GEORGE BANCROFT, bright rosy-crimson, shaded purple, very large. LADY MARY FITZWILLIAM, delicate flesh-colour, very large, globular; a grand variety. NANCY LEE, soft rose, sweetly scented, buds long; very free flowering. PEARL, flesh-white, flowers small, but of perfect form. VISCOUNTESS FALMOUTH, delicate pinkish-rose; back of petals bright pink; highly scented. VISCOUNTESS FOLKESTONE (Bennett), creamy-pink, centre deep salmon-pink; large and very fragrant; new. W. F. BENNETT, bright crimson, described as being like a crimson NIPHETOS; a valuable new variety. YE PRIMROSE DAME (Bennett), primrose-yellow, centre apricot; full, and of good form; new.

Noisette Roses.

AIMÉE VIBERT, pure white; small, full, in large clusters. CAROLINE KUSTER, pale yellow; large and globular form. CELINE FORESTIER, yellow, with a deep yellow centre, of medium size; free-flowering; opens well out-of-doors. CLOTH OF GOLD, deep yellow, sulphur edges, large and fine; a shy blossomer, requiring a warm south wall. JAUNE DESPREZ, buff yellow; of robust habit. LAMARQUE, white, lemon centre; a first-class Rose for any purpose. MARÉCHAL NIEL, beautiful deep yellow; very large, full and globular form, very sweet-scented; undoubtedly one of the finest yellow Roses ever introduced. OPHIRIE, coppery-yellow, medium size, full; a fine climbing Rose. RÊVE D'OR, deep yellow, medium size; makes a good pillar or climbing Rose. SOLFATERRE, bright sulphur, large and full. TRIOMPHE DE RENNES, canary-colour; large, double, fine form. WILLIAM ALLEN RICHARDSON, deep orange-yellow, small, showy, and distinct; a good climbing Rose.

Provence Roses (*R. centifolia*).

CABBAGE or COMMON, rosy-pink, large and fragrant. CRESTED or CRISTATA, rose, pale edges; large and beautiful. WHITE or UNIQUE, paper-white; large and fine.

Miniature Provence or Pompon Roses (*R. centifolia pomponia*).

BURGUNDY, pale purplish-pink; very dwarf and small. DE MEAUX or POMPON, rosy-lilac, very small. SPONG, rosy-lilac, dwarf; a somewhat larger flower than DE MEAUX. WHITE BURGUNDY, white, slightly tinted; dwarf.

Moss Roses (*R. centifolia muscosa*).

BARON DE WASSENAËR, light crimson; vigorous, flowers in clusters. COMMON or OLD, pale rose, moderate, fragrant. COMTESSE DE MURINAIS, white, large and double; very free. GLOIRE DES MOUSSEUSES, rosy-blush; one of the largest. LANEII, rosy-crimson, large and double. LITTLE GEM, crimson; a miniature variety, very small and double, beautifully mossed. MADAME EDWARD ORY, rosy-carmine, vigorous. WHITE BATH, white, beautiful in bud.

French Roses (*R. gallica*).

BOULA DE NANTEUIL, crimson-purple, very large. D'AGUESSEAU, bright crimson, large. GLOIRE DE COLMAR, rich velvety-crimson, fine. KEAN, rich purple, crimson centre; vigorous. NAPOLÉON, deep rose, shaded purple; vigorous. ŒILLET PARFAIT, blush-white, striped crimson; very double.

Damask Roses (*R. damascena*).

LA VILLE DE BRUXELLES, rose, large and fine. MADAME HARDY, pure white; vigorous. MADAME ZOUTMAN, creamy-white, shaded pink, large. YORK AND LANCASTER, white and red, striped; a beautiful, old-fashioned, vigorous border Rose.

Hybrid Bourbon, Hybrid China, and Hybrid Noisette Roses (*R. indica hybrida*).

BLAIRII, No. 2, blush, with rose centre, large. CHARLES LAWSON, vivid rose, very large and double; fine. CHÉNÉDOLÉ, bright red; good for pillars. COUPE D'HÉBÉ, rich deep pink, large and double; vigorous. FULGENS, fine crimson; vigorous. MADAME PLANTIER, pure white; very vigorous and free-flowering. PAUL RICAUT, rosy-crimson; very free. PAUL VERDIER, carmine-red, vigorous. VIVID, rich crimson; fine.

Bourbon Rose.

SOUVENIR DE LA MALMAISON, blush-white, shaded flesh-colour, large and full; flowers best in autumn.

Austrian Briar Roses (*R. lutea*).

AUSTRIAN COPPER, coppery-red, single. AUSTRIAN YELLOW, yellow, single. HARRISONII, golden-yellow; very free and good. PERSIAN YELLOW, deep golden-yellow, vigorous.

Ayrshire Roses (*R. repens hybrida*).

BENNETT'S SEEDLING or THORESBYANA, pure white; vigorous; flowers in clusters. DUNDEE RAMBLER, white, tinged with pink. RUGA, pale flesh, semi-double, very fragrant. SPLENDENS or MYRRH-SCENTED, flesh-colour.

Rosa—*continued.*

Boursault Roses (*R. alpina.*)

AMADIS or CRIMSON, purplish-crimson. GRACILIS, bright pink. SPLENDENS, rosy-blush. Vigorous-growing climbing Roses.

Evergreen Roses (*R. sempervirens*).

FÉLICITÉ PERPÉTUELLE, creamy-white; flowers borne in clusters in the greatest profusion. FLORA, bright rose; full and exceedingly fine. PRINCESS MARIE, deep reddish-pink. Good pillar Roses that retain their foliage through a great part of the winter.

Banksian Roses (*R. Banksiæ*).

ALBA or WHITE, pure white, small, and very double, Violet-scented. LUTEA or YELLOW, yellow, very double. These are half-hardy, sub-evergreen Roses, that require a warm wall, and need but little pruning.

ROSACEÆ. A large natural order of erect or prostrate, very rarely climbing, sometimes sarmentose herbs, shrubs, or trees, widely distributed. Flowers usually regular and hermaphrodite; calyx free or adnate to the ovary; tube short or elongated, narrowed or widened; limb equal (or in *Chrysobalaneæ* often unequal), usually five-lobed, imbricated and persistent, rarely of four lobes or none; petals inserted below the margin of the disk, as many as the calyx lobes, rarely none, equal (or in *Chrysobalaneæ* unequal), obovate, oblong, rounded, or spathulate, usually exunguiculate, imbricated, deciduous; stamens usually indefinite, two to many-seriate, in a few species definite or reduced to one or two; filaments subulate or filiform, incurved in æstivation; anthers small, very rarely elongated; gynæcious carpels one or many, one or many-seriate. Fruit variable, superior or more or less inferior, naked or included within the persistent calyx tube; inflorescence variable. Leaves variable, simple or compound, alternate or rarely opposite, sometimes glandularly serrate; stipules two, free or adnate to the petiole, rarely absent; petioles often dilated at base, and biglandular at the apex. *Rosaceæ* is one of the most important orders from a garden standpoint. It is split up, by the authors of the "Genera Plantarum," into ten tribes—*Chrysobalaneæ, Neuradeæ, Pomeæ, Potentilleæ, Poterieæ, Pruneæ, Quillajeæ, Roseæ, Rubeæ,* and *Spiræeæ*—several of which are regarded, by some other writers, as distinct orders. The principal fruits yielded by members of this order are: Almond, Apple, Apricot, Blackberry, Cherry, Medlar, Nectarine, Peach, Pear, Plum, Quince, Raspberry, Service Berry, and Strawberry. In addition to these, many beautiful flowering plants are included in *Rosaceæ*, the Rose, of course, taking front rank. Rose-water is obtained, by distillation, from the petals of *Rosa centifolia, R. damascena, R. moschata,* &c., as is also the Attar of Roses used in perfumery, by maceration in oil of sesamum. *Chrysobalanus Icaco* furnishes the Cocoa Plum of the West Indies, *Parinarium excelsum* the Grey or Rough-skin Plum, and *P. macrophyllum* the Gingerbread Plum. The bark of *Moquilia utilis*, the Pottery-tree of the Amazons, contains such a large amount of silica, that, when powdered and mixed with clay, it is employed in making pottery by the natives of Para. The order comprises, according to Bentham and Hooker, about seventy-one genera and 1000 species; but some authors place the number of the latter as high as 1500. Characteristic genera: *Chrysobalanus, Cratægus, Potentilla, Pyrus, Rosa, Rubus, Spiræa.*

ROSACEOUS. Arranged like the five petals of a single rose. The term is sometimes used for rose-colour.

ROSANOVIA. Included under **Sinningia** (which *see*).

ROSCHERIA (no doubt commemorative, but name not explained by its author). ORD. *Palmæ.* A monotypic genus. The species is a slender, erect, stove palm, with many aërial roots. It requires cultivation similar to that recommended for **Phœnix** (which *see*).

R. melanochætes (black-spined). *fl.* in two-flowered clusters, spirally arranged on very slender branches of a compoundly

Roscheria—*continued.*

branching spadix in the axil of a leaf, with a long, compressed, glabrous peduncle. *fr.* black, elliptical, about ½in. long. *l.* pale green, 3ft. to 5ft. long, 2ft. to 3ft. broad, entire when young, becoming unequally pinnate; pinnæ 1ft. to 1½ft. long, bifid at the apex, scaly below; petioles 1½ft. to 2½ft. long, smooth, subtriquetrous, grooved down the face with a pale band; sheaths 1½ft. to 2½ft. long, with a few fine black spines rising from a compressed cushion. Stem 2in. to 3in. in diameter, with a ring of spines below each leaf-scar when young. *h.* 15ft. to 25ft. Seychelles, 1871. SYN. *Verschaffeltia melanochætes* (I. H. 1871, 54).

ROSCOEA (named after William Roscoe, 1753-1831, the famous historian, and the founder of the Liverpool Botanic Garden). ORD. *Scitamineæ*. A genus comprising half-a-dozen species of stove, perennial, Himalayan herbs, with thick, fleshy, fibrous rhizomes. Flowers purple, blue, or yellow, in a terminal, fascicled or spiked, sessile or pedunculate inflorescence; calyx long, tubular, two or three-toothed; corolla tube often elongated, shortly enlarged above; lobes three, the dorsal one erect, incurved and concave, the lateral ones spreading or recurved. Leaves narrow or sub-cordate-lanceolate; sheaths long and loose, sometimes very large. *R. purpurea*, the species known to gardeners, thrives in light turfy loam, and may be readily increased by divisions.

R. purpurea (purple-flowered). *fl.* full purple, arising from two or three elongated, sheathing bracts; upper lobe erect, fornicate, two lower ones linear-oblong, spreading; lateral ones short, connate within the upper one; lip large, deflexed, obovate, deeply bilobed at apex. *l.* sessile, lanceolate, striated, very finely acuminated. Stem slender, leafy, about 10in. long, clothed with the striated sheaths of the leaves. Roots tuberous, fasciculately clustered. 1820. (B. M. 4630; B. R. 1840, 61; H. E. F. 144; L. B. C. 1404; S. E. B. 108.)

ROSCOEA (of Roxburgh). A synonym of **Sphenodesma** (which *see*).

ROSE. *See* **Rosa.**

ROSEA. Included under *Iresine*.

ROSE ACACIA. A common name for *Robinia hispida*.

ROSE, ALPINE. *See* **Rhododendron ferrugineum** and **R. hirsutum.**

ROSE APPLE. A common name for *Eugenia Jambos*.

ROSE BAY. *See* **Epilobium angustifolium.** The name is also given to *Nerium Oleander*.

ROSE BEDEGUAR. *See* **Rose Galls.**

ROSE BOX. A common name for *Cotoneaster*.

ROSE BRAND. *See* remarks on FUNGI under **Rosa.**

ROSE BUG. A name occasionally given to Beetles that frequent the flowers of Roses. In England, the name usually denotes the **Rosechafer** (which *see*).

ROSE CAMPION. A common name for **Agrostemma** and **Lychnis** (which *see*).

ROSECHAFER (*Cetonia aurata*). This is one of the handsomest of English Beetles, and is easily known

FIG. 393. ROSECHAFER (*Cetonia aurata*).

by its size (from ⅔in. to nearly 1in. long), and its colour, which is usually brilliant golden-green on the back, with

Rosechafer—*continued.*

wavy, white marks on the wing-cases near the tips, and three slightly raised lines on each. Sometimes, the colour is deep black above. The lower surface of the body is bright copper-coloured. The body is somewhat heavy in form (see Fig. 393). The Rosechafers take their common name from the beetles being partial to the flowers of Roses, which they injure, to some extent, by gnawing the sexual organs. Their colour has also given rise to the name Green Rosechafer. The larvæ feed on dead wood; and the beetles, when emerged from the pupæ, have usually to bore their way to the outer air. Handpicking the beetles is the best remedy, since only in this state are they readily discovered.

ROSE, CHRISTMAS. *See* **Helleborus niger.**

ROSE ELDER. *See* **Viburnum Opulus.**

ROSE GALLS. These are the work of several species of insects, mostly *Cynipidæ* of the genus **Rhodites** (which *see*). This genus, in Europe, includes six species, entirely confined to Rose-galls; and, in North America, it includes four species almost confined to them—only one (*R. radicum*) resorting to Raspberries and Brambles as well as to the Roses, on all of which it causes large, oblong swellings on the root. The insects are, in all cases, small, the European species being from $\frac{1}{10}$in. to ⅕in. long; but the species of *Cynipidæ* require an adept in their study to recognise them, as they are much alike.

FIG. 394. BEDEGUAR GALL.

1, Gall, natural size, on Twig; 2, Gall in section; 3, Larva of *Rhodites Rosæ*, natural size; 4, Front part of Larva; 5, Pupa; 6, Perfect Insect. The Figs. 4, 5, and 6 are magnified.

The Galls on Roses formed by species of *Rhodites* in Europe are as follows: 1. Smooth round Galls, like small peas, on leaflets of *Rosa canina* and of *R. rubiginosa* (the Sweetbriar), formed by *Rh. Eglanteriæ*. 2. Similar Galls on leaves of *Rosa centifolia* (the Cabbage Rose), formed by *R. centifoliæ*. 3. Round Galls, like small peas, but bearing a few long, straight spines, on leaves of several kinds of Roses, formed by *R. rosarum*. 4. Galls on leaves and branches of *Rosa canina*, formed by

Rose Galls—*continued.*

R. Mayri. 5. Irregularly formed red Galls, usually in the leaves, but often in other young parts of *Rosa spinosissima*, less often on *R. canina*; these are usually smooth, bright red, and thick-walled; and often two or more are joined together, so as to form irregular masses. 6. By far the most conspicuous Gall on Roses is that known as the Bedeguar. It may reach a size of 2in. in diameter. It varies a good deal in form, though usually rounded; but the surface is always covered with long, branched, mossy green or red hairs (see Fig. 394, 1). On cutting a Gall across (see Fig. 394, 2), the centre is found to be a mass of woody consistence, in which are numerous cells or spaces, each with a more or less distinct wall of its own. The outer cells can frequently be broken off from the mass. In each cell lives a white larva (see Fig. 394, 3), which in the cell becomes a pupa (Fig. 394, 5), and finally emerges as a four-winged fly (Fig. 394, 6), about $\frac{1}{8}$in. or $\frac{1}{6}$in. long, named *R. Rosæ*. The insects are black, with the legs mostly red-brown or dark brown; and the abdomen of the female is red-brown, with the end black. Weather-beaten fragments of the Galls often remain attached to the twigs for two or three years. A small Midge (*Cecidomyia Rosæ*) galls the leaflets of various Roses, causing them to swell and become fleshy. None of these various Galls can be regarded as really dangerous to cultivated Roses, and most of them, save those of *R. centifoliæ*, are almost confined to wild Roses. Cutting off leaves and branches, as soon as the Galls appear on them, is quite a sufficient check to prevent their undue increase in any locality.

ROSE, GUELDER. *See* **Viburnum Opulus.**

ROSE, HOLLY. A common name for *Helianthemum.*

ROSE, JAMAICA. A common name applied to *Blakea trinervis* and to *Meriania.*

ROSE, JAPANESE. A common name for *Camellia.*

ROSE, JUNO'S. A common name for *Lilium candidum.*

ROSELEAF SAWFLIES. *See* **Rose Sawflies.**

ROSE, LENTEN. A common name applied to the species of *Helleborus* which blossom during Lent.

ROSE MALLOW. A common name for various species of *Hibiscus.*

ROSEMARY (*Rosmarinus officinalis*). A well-known, hardy, evergreen shrub, grown in small quantities in almost every garden. The foliage is used for making what is called Rosemary tea, a decoction sometimes employed, amongst other purposes, for relieving headache. Rosemary may be propagated by seeds, by cuttings, and by layers. Seeds may be sown upon a warm, sunny border. Cuttings, taken in summer, about 6in. long, and dibbled in a shady border, under a hand glass, will root, and be ready for transplanting into permanent quarters the following autumn. Layering may readily be accomplished, in summer, by bringing some of the lower branches down, and pegging them beneath a little sandy soil. Rosemary succeeds best on a light, rather dry, soil and in a sheltered situation, such as the base of a low wall with a south aspect. There are three varieties, namely, the Common or Green-leaved, the Silver-striped, and the Gold-striped. The two last-named are not quite so hardy as the common variety.

ROSEMARY, WILD. *See* **Andromeda polifolia.**

ROSE OF JERICHO. A common name for *Anastatica Hierochuntina.*

ROSE PINK. *See* **Sabbatia angularis.**

ROSE, ROCK. *See* **Cistus.**

ROSE ROOT. *See* **Sedum Rhodiola.**

ROSE, SAGE. An old name for the genus *Cistus.*

ROSE SAWFLIES. Among the most hurtful of insect parasites of Rose-bushes are the Sawflies (*Tenthredinidæ*); a considerable number feed as larvæ either in Rose-twigs or upon the leaflets. Some of these, so far as is known, are confined to Roses for their food, while others feed also on a variety of other plants. The fullest information on the British species is to be found in Mr. Cameron's "Monograph of British Phytophagous Hymenoptera." Not only are the descriptions in the work clear and definite, but the figures of larvæ and insects are a most efficient help in identifications. The pith-feeding larvæ belong to only a few species. *Pœcilosoma candidatum* is one of the best known of these. It has been found near Oxford by Professor Westwood, but is rare. The perfect insect is about $\frac{1}{4}$in. long. It is black, covered with short pubescence, but certain spots on the head are clay-colour, and spots on the thorax and the edges of the abdominal rings are white. The dull white or yellowish larva bores into the pith during May and June, causing the leaves to wither. It becomes a pupa in the soil, after dropping from the branch. The dead branches should be cut off early, to destroy the larvæ in them.

The leaf-feeders on Roses among Sawflies are far more numerous than twig-feeders. Among those that devour the leaves, the most destructive species, probably, is *Eriocampa Rosæ*, a small insect, only about $\frac{1}{8}$in. to $\frac{1}{6}$in. long. It is shining black, with the knees and the feet of the front and middle legs white. The wings are smoky, darker at the base. The larvæ are known as Rose-slugs. They are sluggish in habit. The front segments are swollen a little, and humped. The colour is pale yellowish-green, with a dark line down the back; the head is orange. The larvæ feed on the upper surface of the leaflets, gnawing away the upper skin, and destroying the leaves, which turn brown. The larval stage lasts about fourteen days or three weeks, and the full-grown larvæ reach a length of about $\frac{1}{3}$in. They go underground to form their cocoons. The females lay their eggs on the midribs of the leaves, in May. This insect is plentiful both in Europe and in America, in which country it was first described, being named *Selandria Rosæ* by Harris. It is often very destructive to Rose-bushes in gardens.

Watering the plants with infusion of hellebore, or powdering them with sulphur, as is done to destroy Mildew on Roses, are remedies for these troublesome larvæ.

Blennocampa pusilla, a Sawfly a little larger than the last, is at times as hurtful; but the larvæ have the habit of turning down the sides of the leaflets, and live protected in these retreats. The leaves are sometimes much injured, and the bushes are evidently weakened by this treatment. The larvæ are short, stumpy, and green, with the head pale or brown. There are short, spiny hairs on the back. The skin of the sides of the body hangs down in folds. They become pupæ in cocoons in the soil, and in May and June Sawflies emerge of a shining black, with yellowish-white knees and feet on the front and middle legs, and grey-brown wings. This species is very common.

Emphytus cinctus is another common and hurtful species. It is a little over $\frac{1}{3}$in. long. Like the former, the Sawflies are shining black, except that in the female there is a white band nearly round the fifth segment of the abdomen; the hinder legs are partly white, the other four have the greater part of the shins and the feet reddish; the wings are clear. The eggs are laid on the lower surface of the leaflets. The larvæ feed on the edges of the leaflets, keeping the hinder part of the body curved over the latter, and, when at rest, they lie curled up in a ball on the lower surface of the leaflets. The body is stout, and tapers backwards. It is dark

Rose Sawflies—*continued.*

green above, with the sides light grey, and is sprinkled with small shining white tubercles; the legs are nearly white, and the head varies from yellow to brown. The larvæ, when full-fed, usually bore into the branches, and there become pupæ; but they form their cocoons sometimes among dead leaves and other rubbish on the soil.

E. melanarius and *E. rufocinctus* are nearly allied to the last, with similar habits, but are not so numerous as to call for a detailed description.

Cladius pectinicornis is also rather common upon Roses in gardens. The Sawflies are a little over ⅓in. in length, and are shining black, with scattered fine grey hairs, and yellowish-white knees and feet, and faintly smoky wings, paler near the tips, with the veins near the base reddish. The larvæ lie flat on the lower surface of the leaflets, which they gnaw into holes between the larger leaf-veins. They are flattened, and taper from about the middle towards each end. On each segment are three rows of warts, each of which bears a long brown hair; the head is small. The body is deep green or yellowish-green. The cocoons are spun between dead leaves. There are two broods in the year, the autumn brood passing the winter as larvæ in the cocoons.

Cladius Padi, a nearly allied insect, but only half as long, is often plentiful, and is destructive to Roses, as well as to Pear, Plum, Hawthorn, Birch, and various other trees and shrubs. Its larvæ also eat holes in the leaves. The cocoons are made in the soil. From two to four broods have been recorded in the year.

The genus *Hylotoma*, which has three-jointed antennæ, and the larvæ of which have twelve or fourteen claspers, or prolegs, includes several species that live, as larvæ, on Rose-leaves, viz., *H. enodis*, *H. gracilicornis*, *H. pagana*, *H. Rosæ*, &c. Of these, the last-named species is the most destructive, and we shall therefore describe it as a type of the genus as regards habits of larvæ. *H. Rosæ* is about ⅓in. or ⅔in. long, and is dull yellow, with black head and antennæ and thorax; all the legs are yellow, save that their bases and rings round the feet are

FIG. 395. LARVÆ OF ROSE-LEAF SAWFLY.

black. The larvæ (see Fig. 395) are bluish-green, with yellow spots along each side of the middle line, and on the sides are black spots, bearing bristles. The head is black-brown. There are two broods, the insects appearing in May and June, and again in August and September. The females lay their eggs in slits in young branches. The larvæ hatch in a few days, and crawl on to the leaflets, which they gnaw from the edge inwards. Fig. 395 shows two characteristic attitudes, that on the left being assumed if they are disturbed. They cast their skin about four times. When full-fed, they creep underground, and there spin cocoons and become pupæ.

Lyda inanita is the only other Sawfly which we shall mention specially as feeding on Rose-leaves. This

Rose Sawflies—*continued.*

insect is black, except a broad, dirty, yellow band lengthwise on the abdomen, yellow markings on head, antennæ yellow at their base, and brick-red elsewhere, and legs straw-yellow. The antennæ are twenty-one-jointed. The larvæ are yellowish-green, with broken red lines on the sides, and a black spot on each side of the first body-ring. Each larva lives in a tubular sack, formed of fragments of Rose-leaves arranged spirally. When full-fed, it leaves its sack (then as much as 2in. long), hanging to the back of a leaf, and burrows underground, there to become a pupa, from which the Sawfly emerges next year.

Remedies. Most kinds of Sawfly larvæ can be shaken off the bushes into vessels, or on to sheets, from which they can be swept up, to be destroyed; or the bushes may be sprinkled with flowers of sulphur, or watered with infusion of hellebore or of Paris green. Hand-picking is effectual only if the bushes are few, but is the best remedy for *Lyda inanita* and *Blennocampa pusilla*, which live concealed—not exposed, as do the others. It is advisable also to capture the Sawflies, either by using a sweeping-net, or shaking the insects off their favourite perches into some vessel or receptacle. This should be tried only in cloudy weather, as the insects are then quite sluggish, but take to flight readily in sunny weather. It has been found useful to grow flowering plants of Parsley among the Rose-bushes, as the insects congregate on the flowers, and can easily be taken upon them in the sweeping-net. The pupæ may be destroyed by removing and burning all loose, dead leaves, &c.; and by removing a few inches of surface-soil, in autumn, with the cocoons. In this way, both those that become pupæ in debris, and those that do so in the soil, are destroyed.

ROSE SLUG. The popular name of the destructive larvæ of **Rose Sawflies** (which *see*), but more especially employed for the slug-like larva of *Eriocampa Rosæ*.

ROSETTE MULLEIN. *See* **Ramondia pyrenaica.**

ROSE WILLOW. *See* **Salix rubra Helix.**

ROSE, WIND. A common name applied to *Papaver Rhœas* and *Rœmeria hybrida*.

ROSEWOOD-TREE. A name applied to several species of *Dalbergia*, &c.

ROSIN PLANT. *See* **Silphium.**

ROSMARINUS (from *ros*, dew, and *marinus*, of the sea; referring to the habitat of the plant). ORD. *Labiatæ*. A monotypic genus. The species is a densely-branched and leafy, hardy shrub, employed in the manufacture of Hungary Water. For culture, &c., *see* **Rosemary.**

R. officinalis (officinal).* Common Rosemary; Old Man. *fl.* in short, axillary, few-flowered racemes, approximating, opposite, sub-sessile; calyx of a purplish colour, ovoid-campanulate, bilabiate; corolla white or pale bluish-purple, the tube shortly exserted, the limb bilabiate. February. *l.* sessile, linear, entire, with revolute margins, canescent beneath. *h.* 2ft. to 4ft. Mediterranean region, 1848. (S. F. G. 14.)

ROSTELLARIA (of Nees). Included under *Justicia*.

ROSTELLUM. A diminutive beak. A narrow extension of the upper edge of the stigma of certain Orchids.

ROSTRARIA. Included under **Trisetum** (which *see*).

ROSTRATE. Having a rostrum; terminating gradually in a long, straight, hard point; *e.g.*, the pod of a Radish.

ROSTRUM. A beak-like extension.

ROSULAR, ROSULATE. Collected in a rosette.

ROTATE. Wheel-shaped; circular and horizontally spreading, very flat; *e.g.*, a gamopetalous corolla, with a very short tube and a spreading limb.

ROTATION CROPPING. Cropping by Rotation is a term used in reference to kitchen garden management. It implies that the ground on which a certain crop is grown shall be planted in Rotation, by another crop of, as far as possible, quite a different character. This system is pretty generally believed in and practised in large gardens; in small ones, there is often neither sufficient space nor variety in the crops annually grown to give an opportunity for changing the situation for each. Where plenty of manure can be added for each crop, it is of not so much consequence, as additional nutriment will thereby be supplied to take the place of that which the preceding one will have absorbed. It is undoubtedly a good plan to adopt a system of Rotation Cropping, so far as possible, as one sort of vegetable will not, as a rule, require exactly the same constituent parts of the soil to nourish it as another which is of an entirely different nature and habit. In changing crops, it is best to avoid planting any to succeed others which belong to the same Natural Order, as, for instance, the different representatives of the extensive Brassica, or Cabbage tribe. These should be made to follow such crops as Beans, Onions, Peas, Potatoes, &c. It is invariably a good arrangement to grow Peas on land which has, during the previous year, been planted with Celery. Many other instances might be named, but they would not be generally applicable, as, for various reasons, ground has to be cropped at certain times and seasons, when it is impossible to pay very much attention to planting under such a system as that indicated. Crops grown for the use of their roots should not follow one another, if it can be avoided; such, for instance, as Carrots, Parsnips, and other plants of the order *Umbelliferæ*. Onions may follow and be followed by plants of the Brassica tribe.

ROTHMANNIA. Included under **Gardenia** (which *see*).

ROTTBOELLIA (named in honour of C. F. Rottboell, 1727-1797, a Danish botanist). SYN. *Stegosia*. ORD. *Gramineæ*. A genus comprising about eighteen species of often tall, hispid or glabrous, stove or hardy grasses, broadly dispersed over warm regions, one being found in the Orient. Spikelets closely adpressed, pedicellate, inserted in notches on alternate sides of the spike, which is simple, or very rarely twice or thrice divided at the base; glumes four; peduncles solitary or fascicled. Leaves flat. A few of the species have been introduced, but they are more curious than beautiful.

ROTTLERA (of Willdenow). A synonym of **Trewia** (which *see*).

ROTUND, ROTUNDATE. Rounded in outline; usually applied to bodies which are not round themselves, but only at their ends.

ROUGE PLANT. *See* **Rivina humilis.**

ROULINIA. A synonym of **Nolina** (which *see*).

ROUPALA (said to be the native name in Guiana). Otherwise spelt by various authors *Rhopala*, *Ropala*, and *Rupala*. ORD. *Proteaceæ*. A genus of handsome stove, glabrous, or ferruginously-tomentose trees, natives of tropical America. About thirty species have been enumerated; but they are very difficult to distinguish, entire, toothed, and pinnate leaves being sometimes found on the same tree. Flowers regular, twin-pedicellate, disposed in axillary or lateral racemes; perianth cylindrical, the segments eventually becoming recurved at apex. Fruit a hard, obliquely two-valved, shortly stipitate capsule. Leaves alternate, coriaceous, rigid, entire or toothed, undivided or on the sterile branches (of young trees?) pinnate. The species best known to cultivation are described below. They thrive in a compost of peat and loam. Propagation may be effected by cuttings, inserted in sand, under a glass, with bottom heat.

Roupala—*continued.*

R. Boissieriana (Boissier's). *fl.* yellow; racemes axillary, solitary or twin, sub-sessile, 5in. to 6in. long. *l.* ovate, 3in. to 4in. long, long-acuminate, rounded at base, shortly decurrent into petioles 1in. to 1½in. long. New Grenada, 1853.

R. complicata (folded-leaved). *fl.* pale rufous, very sweet-scented, in rather loose racemes, 3in. to 5in. long. *l.* ovate, thickly coriaceous, glaucescent, 1½in. to 5in. long, 1in. to 3in. broad, entire or rarely with a few remote or obtuse teeth, attenuated-acuminate, broadly rounded at base, decurrent to petioles about 1in. long. *h.* 6ft. to 8ft. Columbia, 1853.

R. corcovadensis (Corcovado). A synonym of *R. Pohlii*.

R. elegans (elegant). *l.* impari-pinnate, 3in. to 12in. long, nine to twelve-jugate; leaflets lanceolate, acuminate, serrate, 2in. to 4in. long, with mucronulate teeth; lateral ones falcate, very unequal at base; terminal ones not larger. Branches slenderly striate. Brazil.

R. heterophylla (variable-leaved).* *fl.*, racemes axillary, solitary or twin, sub-sessile, about 3in. long. *l.* remotely obtuse-toothed, or occasionally entire at base, shining above, the nerves elevated on both surfaces. Branches twiggy, densely leafy. Brazil. (R. G. 1863, 402.)

R. media (middle). *fl.* green; racemes rufous-tomentose, longer than the leaves. May. *l.* elliptic, acute and acuminate, mostly simple, but occasionally pinnately trifoliolate, with ovate, entire leaflets. *h.* 10ft. Guiana, 1823.

R. montana (mountain). *fl.* sweet-scented, with yellow or fulvous tomentum; racemes terminal and axillary, solitary or twin, 5in. to 6in. long, sub-sessile. April. *l.* elliptic, rigid, 2in. to 3in. long, shortly acute or acuminate, nearly entire, decurrent, on slender petioles, with a few obsolete teeth. *h.* 10ft. Guiana, 1823.

R. obovata (obovate-leaved). *fr.* 1in. long, sessile, oblong, sub-falcate. *l.* obovate, very shortly acuminate, cuneate-attenuated at base, remotely toothed and here and there entire, 3in. to 6in. long, 2½in. broad; petioles 1in. long. *h.* 24ft. Popayan, 1855.

R. Pohlii (Pohl's).* *fl.* orange-red, clustered in dense, rufous-woolly racemes, which are 6in. to 12in. long, sessile and solitary in the uppermost axils. *l.* rigid, pinnatisect or entire, ovate or elliptic, acuminate at both ends, irregularly serrate, glabrous, and shining above, woolly-tomentose beneath. *h.* 6ft. to 20ft. Minas Geraes. (B. M. 6095.) SYN. *R. corcovadensis*.

ROUPELLIA (named in honour of the Roupell family, encouragers of botany). ORD. *Apocynaceæ*. A genus comprising two or three species of stove or greenhouse, glabrous, sometimes climbing, African shrubs. Flowers white or pink, showy, in terminal, dichotomous cymes; calyx of five oblong or lanceolate segments; corolla funnel-shaped, with a short tube, an ample campanulate throat, and ten processes, united in a ring below; lobes five, broad, twisted. Follicles long, hard, and thick, divaricating, connate at base. Leaves opposite, penniveined. *R. grata*, the only species introduced, is a tall, stove climber, thriving in a compost of fibry loam and peat. It may be increased by means of cuttings of the young shoots, inserted in sand, under a bell glass, in heat.

R. grata (agreeably-scented). Cream Fruit-tree. *fl.*, corolla white, tinged with pale rose-colour, very fragrant, in dense, sessile cymes; corolla segments broadly obovate; coronal processes pale rose-colour. May. *fr.* the Cream Fruit of the natives. *l.* nearly 1ft. long, shortly petiolate, oblong-elliptic, shortly acuminate, prickly at base, rather thick; petioles red, scarcely dilated at base. Sierra Leone. (B. M. 4466.)

ROUREA (name not explained; probably altered from the Indian native name of one of the Guiana species). SYNS. *Canicidia*, *Robergia* (of Schreber). ORD. *Connaraceæ*. A genus comprising about forty-two species of stove trees and shrubs; one is African, and the rest tropical American. Flowers small, in axillary, many-flowered panicles. Leaves alternate, evergreen, coriaceous, impari-pinnate. *R. frutescens*, the only species introduced, is probably lost to cultivation.

ROUSSÆACEÆ. Included under *Saxifrageæ*.

ROWAN OR ROAN-TREE. A common name for *Pyrus Aucuparia*.

ROXBURGHIA. A synonym of **Stemona** (which *see*).

ROXBURGHIACEÆ. A small natural order of twining or erect, half-shrubby plants, natives of tropical Asia and Australia, Japan, and Florida. Flowers herm-

Roxburghiaceæ—*continued.*

aphrodite, regular; perianth of four sub-equal, petaloid, biseriate, lobes or segments; stamens four, affixed at the base of the lobes or segments, or nearly hypogynous; filaments rather thick, free or connate in a ring at the base; peduncles axillary, filiform, one or loosely few-flowered, or densely many-flowered. Capsule at length two-valved. Leaves alternate or scattered, petiolate, three to many-nerved, with thick, parallel, transverse veinlets. The tuberous root of the species of *Stemona* is candied in India. *Roxburghiaceæ* comprises only about eight species, which Bentham and Hooker classify under three genera: *Croomia*, *Stemona*, and *Stichoneuron*.

ROYAL FERN. *See* **Osmunda regalis.**

ROYAL PEACOCK FLOWER. *See* **Poinciana regia.**

ROYENA (named by Linnæus, in honour of Adrian Van Royen; he and his son David were successively professors of Botany at Leyden). ORD. *Ebenaceæ*. A genus comprising thirteen species of greenhouse shrubs or trees, natives of tropical and southern extra-tropical Africa. Flowers axillary, pedunculate, solitary or rarely few in a fascicle or three to five in a cyme; calyx five, rarely four, parted or toothed; corolla urceolate or campanulate, with five, rarely four, twisted, reflexed lobes. Fruit globose, ovoid or oblong. Leaves sessile or shortly petiolate. The species possess but little beauty. Several have been introduced, but the two described below are the only representatives of the genus which call for mention here. They thrive in sandy loam. Propagation may be effected by means of cuttings, which strike freely in sand, under a bell glass.

R. lucida (clear).* African Bladder Nut or Snowdrop-tree. *fl.* white, solitary on axillary peduncles ½in. to 1in. long; corolla five-fid. *fr.* red and fleshy when ripe, ½in. to 1in. in diameter. *l.* elliptical or somewhat ovate, usually pointed or apiculate at apex, obtuse or sub-acute, rounded or cordate or very rarely narrowed at base, ½in. to 2½in. long, ¼in. to 1¼in. broad, shining above, on short petioles. *h.* 5ft. to 12ft. 1690. (B. R. 1846, 40.)

R. pallens (pale). *fl.* white or yellowish; peduncles usually much longer than the flowers. June. *fr.* ½in. to 1in. in diameter, subglobose or ovoid. *l.* narrowly obovate-elliptic, obtuse or rarely acute at apex, narrowed at the base into a short petiole, silky, especially beneath, or glabrate, evergreen, ½in. to 2in. long, ⅛in. to ¾in. wide. Branches pale or cinereous, silky-pubescent or often glabrescent. *h.* 4ft. to 15ft. 1752. SYN. *R. pubescens* (B. R. 500).

R. pubescens (pubescent). A synonym of *R. pallens*.

ROYLEA (named in honour of John Forbes Royle, once superintendent of the Botanic Gardens at Saharumpur, and Professor of Materia Medica at King's College, London). ORD. *Labiatæ*. A monotypic genus. The species is an interesting, erect, much-branched, greenhouse, cinereous shrub, with obsoletely quadrangular, spreading, paniculate branches. It will thrive in any light, rich soil. Cuttings will root readily in similar soil, if a glass be placed over them.

R. elegans (elegant). *fl.*, whorls six to ten-flowered, loose; calyx over ½in. long, cano-pubescent; corolla white, much diluted with rose-colour. July. *l.* copious, petiolate, ovate, acute, loosely sub-cordate, deeply and obtusely serrated, 1in. to 1½in. long, green above, hoary beneath. *h.* 3ft. to 5ft. Himalayas, 1824.

RUBBER PLANT, EAST INDIAN. A common name for *Ficus elastica*.

RUBBER-TREE, AFRICAN. A common name for *Landolphia*.

RUBESCENT. Reddish; turning red.

RUBIA (from *ruber*, red; alluding to the dye which is extracted from the plant). Madder. ORD. *Rubiaceæ*. A genus comprising about thirty species of mostly hardy herbs, sometimes shrubby at the base, inhabiting mostly temperate regions. Flowers small or minute, in axillary and terminal cymes. Leaves in whorls of four or rarely six, very rarely opposite and stipuled, sessile or petiolate. The species are of no particular horticultural value. *P. peregrina* is a British evergreen. *R. tinctorum* is the species which furnishes the valuable dye.

Rubia—*continued.*

RUBIACEÆ. A large and important natural order of erect, prostrate, or climbing trees, shrubs, or herbs, mostly tropical and sub-tropical. Flowers hermaphrodite, rarely unisexual, usually regular and symmetrical, variously disposed; calyx tube adnate to the ovary, the limb superior, obsoletely cup-like or tubular, entire, toothed, or lobed; corolla gamopetalous, infundibular, hypocrateriform, campanulate, or rotate, rarely urceolate or tubular, glabrous, pilose or villous within; limb equal, or very rarely unequal or bilabiate; lobes valvate in æstivation, rarely twisted or imbricated; stamens as many as the corolla lobes, very rarely fewer, inserted in the throat or tube; filaments short, elongated, or wanting, very rarely monadelphous; anthers usually two-celled. Fruit a capsule, berry, or drupe, two to ten (very rarely one) seeded. Leaves simple, opposite or whorled, entire, very rarely obtusely crenate, serrated, toothed, or pinnatifid-lobed; stipules various, persistent or deciduous, simple, or bifid or two-parted, free or connate with the petioles, or confluent in an axillary sheath, entire, toothed, or bristly, very rarely leaf-like. Among the economical products of *Rubiaceæ*, coffee and quinine take front rank; madder, a valuable dye, may also be mentioned. The order comprises about 340 genera and 4100 species, many of which are well known in gardens. Examples: *Bouvardia*, *Cinchona*, *Gardenia*, *Guettarda*, *Rondeletia*.

RUBICUND. Blushing; turning rosy-red.

RUBIGINOSE. Brownish rusty-red.

RUBUS (the Roman name, kindred with *ruber*, red). Bramble, &c. Including *Comaropsis* (in part), *Dalibarda*. ORD. *Rosaceæ*. A large genus (comprising, according to Bentham and Hooker, probably about 100 distinct species) of stove, greenhouse, or hardy, creeping herbs or generally sarmentose and prickly shrubs, broadly dispersed. Flowers white or pink, disposed in terminal and axillary panicles or corymbs; calyx explanate, with a short, rather broad, ebracteolate tube and five persistent lobes; petals five; stamens numerous, very rarely definite; filaments filiform; anthers didymous; carpels numerous, rarely few, inserted on a convex receptacle; achenes drupaceous, rarely dry. Fruit often edible. Leaves scattered, alternate, simple, lobed, three to five-foliolate, or impari-pinnate; stipules adnate to the petioles. Among the most important species of this extensive genus are the following: *R. Chamæmorus* (Cloudberry), *R. fruticosus* (Blackberry) and *R. f. cæsius* (Dewberry), *R. Idæus* (Raspberry), and *R. occidentalis* (Virginian Raspberry). A selection of the best-known species is presented below. Except where otherwise indicated, they are hardy, deciduous shrubs. They succeed in almost any good garden soil, and may be propagated by seeds, by layers, and by covering the points of the shoots with soil. *R. biflorus* is very ornamental on a wall, because of its stems, which appear as if they had been whitewashed. *R. laciniatus* is a fine, free-growing, and ornamental subject for planting in beds where it can be allowed to grow freely. Of the common Bramble (*R. fruticosus*) there are several varieties well worthy of being cultivated for their large fruits, which are handsome and good, either raw, cooked, or preserved. They are mostly of American origin, and succeed well under similar culture to the **Raspberry** (which *see*). The following are the best: EARLY HARVEST, medium-sized fruit, an immense cropper, very vigorous; KITTATINNY; LAWTON; MAMMOTH; PARSLEY-LEAVED; WILSON, JUN., one of the finest and most prolific varieties, new; WILSON'S EARLY, fruit large, early, plant very productive. The common species itself bears immense

Rubus—*continued.*

quantities of fruits in the hedgerows, which are sometimes gathered and made remunerative.

R. arcticus (Arctic). *fl.* reddish; sepals lanceolate, often shorter than the obovate, entire or emarginate petals. June. *fr.* amber-coloured, delicious. *l.* trifoliolate; leaflets rhombic-ovate or obovate, coarsely and often doubly serrated, petiolulate. Stem low, herbaceous, unarmed. Arctic regions of both hemispheres. (B. M. 132; R. G. 314.)

R. australis (Southern).* *fl.* pink or whitish, fragrant, very numerous, in branched, prickly, downy panicles, ½in. to ¾in. in diameter. Early summer. *fr.* numerous, yellowish, juicy, austere. *l.* very variable, ovate to lanceolate, or reduced to prickly midribs, 3in. to 5in. long. Prickles scattered, recurved. New Zealand. A lofty climber, hardy against a wall or in a sheltered spot.

FIG. 396. INFLORESCENCE OF RUBUS FRUTICOSUS CÆSIUS.

R. biflorus (two-flowered).* *fl.* white, ½in. to ¾in. in diameter, one to three together on axillary, slender, drooping peduncles; calyx pubescent. May. *fr.* golden-yellow, globose, ¾in. in diameter; drupes twenty to thirty. *l.*, leaflets three or five, 1in. to 1½in. long, ovate, lobulate, doubly toothed, white and tomentose beneath, pubescent or hairy above. Stems and branches rambling, white with glaucous bloom; prickles very strong, recurved. Himalayas, 1818. (B. M. 4678.)

R. canadensis (Canadian). American Dewberry; Low Blackberry. *fl.* white, racemose, with leaf-like bracts. May. *fr.* blackish, ovate or oblong, excellent, ripening earlier than that of *R. villosus*. *l.*, leaflets three (or pedately five to seven), oval or ovate-lanceolate, mostly acute, thin, nearly smooth, sharply cut-serrated. Stems extensively trailing, slightly prickly. North America, 1811.

R. Chamæmorus (ground Mulberry).* Cloudberry. *fl.* white, 1in. in diameter; sepals unequal, villous; petals oblong. June and July. *fr.* orange-yellow, ½in. in diameter; drupes few, large. *l.* few, sub-orbicular-cordate, obtusely five to seven-lobed, 1in. to 3in. in diameter, petiolate, crenate, wrinkled. Stem 4in. to 8in. high, erect, unarmed, simple, one-flowered, herbaceous or nearly so. Europe (Britain). (Sy. En. B. 440.)

R. cratægifolius (Hawthorn-leaved). *fl.* white, axillary, solitary, or terminal, sub-racemose; sepals acuminate, mostly recurved; petals clawed, obovate-spathulate, often retuse at apex. *fr.* rich dark red. *l.* cordate, trifid, or more or less lobed or toothed. Branches, petioles, and nerves of the leaves, armed with recurved prickles. North China and Japan. (R. G. 591, 924.)

R. cuneifolius (wedge-shape-leaved). Sand Blackberry. *fl.* white; petals large; peduncles two to four-flowered. May to July. *fr.* blackish, ovate or oblong, good-flavoured, ripening in August. *l.*, leaflets three to five, cuneate-obovate, rather thick, serrated above. Stems upright, armed with stout, recurved prickles. Branchlets and under side of leaves whitish-woolly. *h.* 1ft. to 3ft. North America, 1811.

R. Dalibarda (Dalibarda). This is the correct name of the plant described in this work as *Dalibarda repens*.

R. deliciosus (delicious).* *fl.* purple; sepals ovate-oblong, with a dilated acumination, shorter than the oval petals. May. *fr.* large, and of delicious flavour. *l.* reniform-orbicular, wrinkled, slightly three to five-lobed, finely serrate-toothed; stipules persistent. Stem erect. Branches, young leaves, and calyx, tomentose-pubescent. *h.* 3ft. North America, 1870. (B. M. 6062; G. C. n. s., xv. 537.)

R. fruticosus (shrubby).* Blackberry; Common Bramble. *fl.* white or pink, in terminal racemes, the lateral branches corymbose or elongated. July to September. *fr.* black or reddish-purple. *l.* usually pinnately three to five foliolate, sub-persistent, glabrous or pubescent; leaflets on long or short petioles, obovate or rhomboid-obovate, coarsely and irregularly serrated or toothed, convex, dark green above, pale and often glaucous beneath. Stem glabrous or bristly, prickly. Europe (Britain), &c. Under this species, Mr. Baker classifies twenty-one sub-species.

R. f. cæsius (grey). Dewberry. *fl.*, sepals appressed, densely tomentose all over the back. *fr.*, drupes few, large, glaucous. *l.*, leaflets usually three, green on both surfaces. Stem prostrate, glaucous. Prickles unequal, setaceous. See Fig. 396.

R. Idæus (Mount Ida). Raspberry. *fl.* white, drooping; calyx long-tipped; cymes ½in. in diameter, few-flowered. June to August. *fr.*, drupes many, red or yellow, hoary. *l.* ovate or elliptic, acuminate, 3in. to 5in. long, acutely and irregularly serrated, white and hoary beneath. Stems 3ft. to 5ft. high, biennial, terete, prickly, pruinose. Europe (Britain). For culture, &c. *see* **Raspberry.**

R. laciniatus (torn).* *fl.* white or rose-coloured, in loose panicles; calyx segments prickly, somewhat leafy, reflexed at apex; petals three-lobed at apex. June to September. *l.*, leaflets three to five, dissected and sharply serrated, puberulous beneath. Stems nearly terete, straggling. Prickles dilated at base. (W. D. B. 69.)

R. lasiocarpus (woolly-fruited). *fl.* deep pink, small; petals orbicular or broadly obovate; corymbs small, axillary and terminal, corymbose. May. *fr.* red or orange, small, globose, hoary. *l.* 3in. to 10in. long; leaflets five to nine, ovate, elliptic, or ovate-lanceolate, 1in. to 3in. long, acutely toothed or serrated, beneath usually hoary, the terminal one above lobulate. Branches cylindric, rambling. Prickles stout, variable. Himalayas.

R. l. pauciflorus (few-flowered). *fl.* small, puberulous, crowded in corymbs. A common Himalayan form, glabrous and shining except the under surface of the leaves. (B. R. 854, under name of *R. pauciflorus*.)

R. nutans (nodding). *fl.* white, usually solitary, axillary, 1½in. broad, on stout peduncles; calyx tube villous. June. *fr.* of few scarlet drupes. *l.*, leaflets three, orbicular or sub-rhomboidal, 1½in. to 3in. long and broad, obscurely lobed, acutely and doubly toothed, the lateral ones shortly petiolulate. Stem 1ft. to 2ft. long, unarmed, from a woody rootstock. Himalayas, 1850. (B. M. 5023.)

R. nutkanus (Nootka). *fl.* white, very large; sepals long-cuspidate; peduncles rather few-flowered. August. *fr.* red. *l.* five-lobed; lobes nearly equal, broad, coarsely and unequally toothed. Stems flexuous, hirsute. *h.* varying from 1ft. to 10ft. North America, 1826. (B. M. 3453; B. R. 1368; S. B. F. G. ser. ii. 83.)

R. occidentalis (Western). Black Raspberry; Thimbleberry; Virginian Raspberry. *fl.* white; petals small, erect, shorter than the sepals. May. *fr.* purplish-black (rarely whitish), hemispherical, ripening early in July. *l.*, leaflets three, rarely five, ovate, acute, coarsely and doubly serrated, white-downy beneath, the lateral ones somewhat stalked. Stems recurved, with hooked prickles. North America, 1696.

R. odoratus (fragrant). Purple-flowering Raspberry. *fl.* purplish-rose, showy, 2in. broad; calyx lobes tipped with a long, narrow appendage; petals rounded; peduncles many-flowered. June to August. *fr.* reddish, flat and broad. *l.* three to five-lobed; lobes pointed and minutely toothed, the middle one prolonged. Stem 3ft. to 5ft. high, not prickly. North America, 1700. (B. M. 323.)

R. parvifolius (small-leaved). *fl.* red, racemose; calyx segments tomentose, ovate, short. August and September. *fr.* red, globose. *l.* trifoliolate; leaflets clothed with white tomentum beneath. Stems terete, tomentose. *h.* 1ft. to 2ft. Japan, 1818. (B. R. 496.)

R. phœnicolasius (purple-haired). *fl.* pale pink, in terminal racemes; calyx 1½in. to 2in. in diameter; petals minute, erect. Midsummer. *fr.* scarlet, ovoid-oblong, ¾in. long, of forty or more ellipsoid drupes. *l.* 5in. to 7in. long, pinnately trifoliolate or the uppermost ones simple; leaflets crenate-serrated, white-tomentose beneath. Stem tall, sub-scandent. Japan, 1877. Plant covered with stiff, gland-tipped, red-purple hairs. (B. M. 6479.)

R. reflexus (reflexed). *fl.* white, racemose, axillary; sepals ovate, bluntish, equalling the petals; racemes few-flowered, nearly sessile, reflexed. July and August. *l.* oblong-cordate, three to five-lobed, densely tomentose beneath; terminal lobe elongated. Stems unarmed, straggling. Branches terete. China, 1817. Greenhouse. (B. R. 461.)

R. rosæfolius (Rose-leaved). *fl.* white, ¾in. to 1in. in diameter, solitary or in very loose panicles. August. *fr.* orange-red, globose or oblong, of innumerable, minute, glabrous drupes. *l.*, leaflets five to seven, ovate-lanceolate, acuminate, doubly incised-serrated, 1in. to 2in. long, rarely more. Stems erect or inclined, with scattered, hooked prickles. Himalayas, 1811. Greenhouse. (F. d. S. 1714.)

R. r. coronarius (crowned). *fl.*, petals numerous, much longer than the calyx. (B. M. 1783; G. C. n. s., xi. 77; L. B. C. 158.)

R. spectabilis (showy).* Salmon Berry. *fl.* bright red, very large; sepals hairy at base, much shorter than the petals; peduncles solitary or in pairs, one or two-flowered. May. *fr.* red, ovoid, more than double the size of the common Raspberry, but inferior in flavour. *l.* nearly glabrous, trifoliolate; leaflets ovate, acuminate, membranous, somewhat pinnatifid-

Rubus—*continued.*

incised, serrated, the lateral ones distant from the terminal one, often deeply two-lobed. Stem erect, 6ft. to 10ft. high, unarmed or with deciduous prickles. North America, 1827. (B. R. 1424; L. B. C. 1602.)

R. strigosus (hairy). American Wild Red Raspberry. *fl.* white, small; petals erect, as long as the sepals. June and July. *fr.* light red, hemispherical, ripening all summer, "tenderer than the garden or European Raspberry" (Asa Gray). *l.*, leaflets three to five, oblong ovate, acute, cut-serrated, whitish-downy beneath, the lateral ones sessile. Stems biennial and woody, prickly, upright. *h.* 3ft. North America.

R. triflorus (three-flowered). Dwarf Raspberry. *fl.* white, small; sepals and petals often six or seven, the latter erect; peduncle one to three-flowered. June. *fr.* of few separate grains. *l.* three (or pedately five) foliolate; leaflets rhombic-ovate or ovate-lanceolate, acute at both ends, coarsely and doubly serrated, thin, smooth. Stems ascending, 6ft. to 12ft. high, or trailing, not prickly. North America. (H. F. B. A. i. 62.)

R. villosus (hairy). American High Blackberry. *fl.* white, racemose, numerous; sepals much shorter than the obovate-oblong petals. May and June. *fr.* blackish, large, ripening in August and September. *l.*, leaflets three (or pedately five), ovate, acute, unequally serrated, the terminal ones somewhat cordate, conspicuously stalked. Stems upright or reclining, armed with stout, curved prickles. *h.* 1ft. to 6ft. North America, 1777.

RUCKIA (of Regel). A synonym of **Rhodostachys** (which *see*).

RUDBECKIA (named in honour of Olaf Rudbec, Professor of Botany at Upsal). Cone Flower. Including *Centrocarpha*, *Dracopis*, *Helichroa*, *Lepachys*, *Obeliscaria* and *Ratibida*. ORD. *Compositæ*. A genus comprising about twenty-five species of greenhouse or hardy, slightly branched, perennial herbs, natives of North America. Flower-heads purplish, violet, or pale (sometimes with

FIG. 397. UPPER PORTION OF STEM OF RUDBECKIA PINNATA.

the ray, and rarely the disk, yellow), large or mediocre, solitary or few, on long peduncles; involucre hemispherical, the bracts in two, three, or four series; receptacle much elevated, conical or columnar; ray florets ligulate, spreading, often elongated, entire or with two or three short teeth at the apex; achenes glabrous. Leaves alternate or rarely opposite, entire, toothed, incised, or pinnatisect. The under-mentioned species are

Rudbeckia—*continued.*

all hardy, and will thrive in any ordinary garden soil Increased by divisions, or by seeds. *R. maxima* and *R. speciosa* are two of the most attractive of hardy perennials for mixed borders and massing.

FIG. 398. UPPER PORTION OF STEM OF RUDBECKIA PURPUREA.

R. columnaris (columnar). *fl.-heads*, ray florets yellow, or sometimes yellowish-red, elongated, dependent, bidentate at apex. September. *l.* pinnatisect; segments linear-lanceolate, acute, entire, the terminal one almost equalling the rest. *h.* 3ft. 1811. (B. M. 1601.)

R. fulgida (brilliant). *fl.-heads*, ray florets orange-yellow, about twelve, equalling or exceeding the involucre; disk dark purple, the chaff nearly smooth. July. *l.* spathulate-oblong or lanceolate, partly stem-clasping, triple-nerved, the upper ones entire, mostly obtuse. *h.* 1ft. to 3ft. 1760. Plant hairy. (B. M. 1996.)

R. grandiflora (large-flowered).* *fl.-heads*, ray florets yellow 2in. long, dependent; disk dark purple, convex. September. *l.* petiolate, acute, attenuated at base, reticulate-veined; lower ones ovate, crenate-toothed; upper ones lanceolate, very scabrous, obsoletely crenate. Stem angular, branched. *h.* 3½ft. 1830. (S. B. F. G. ser. ii. 87, under name of *Centrocarpha grandiflora*.)

R. hirta (hairy). *fl.-heads* large, solitary; ray florets yellow, about fourteen, more or less exceeding the involucre; disk dull brown, the chaff hairy at the tip. June to August. *l.* nearly entire; upper ones oblong or lanceolate, sessile; lower ones spathulate, triple-nerved, sessile. Stems simple or branched near the base, 1ft. to 2ft. high. 1714. Plant very rough and bristly-hairy. (S. B. F. G. 82.)

R. maxima (greatest).* *fl.-heads* solitary, on long peduncles; ray florets pure yellow, 2in. long, drooping; disk columnar, elongated. August. *l.* large, membranous, oval or oblong, slightly toothed or entire, feather-veined, the lower ones petiolate, the upper ones clasping; lowest ones 8in. to 12in. long. Stem 4ft. to 9ft. high. A handsome plant.

R. Newmanii (Newman's). A synonym of *R. speciosa*.

R. pallida (pale). This is the correct name of the plant described in this work as *Echinacea angustifolia*.

R. pinnata (pinnate-leaved).* *fl.-heads*, ray florets light yellow, large and drooping, much longer than the oblong disk; receptacle exhaling a pleasant, anisate odour when bruised. July. *l.* alternate, pinnate; leaflets three to seven, lanceolate, acute. *h.* 3ft.

Rudbeckia—*continued.*

1803. See Fig. 397. (B. M. 2310; S. E. B. 38.) SYN. *Lepachys pinnata.*

R. purpurea (purple).* This is the correct name of the plant described in this work as *Echinacea purpurea.* See Fig. 398.

R. speciosa (showy).* *fl.-heads* 2½in. to 4in. across; ray florets orange-coloured, contrasting well with the black-purple disk. Summer. *l.*, lowest ones ovate, strongly ribbed, coarsely toothed, borne on slender stalks 6in. to 9in. long; succeeding ones gradually becoming narrower; uppermost ones sessile. Stems freely branched below. *h.* 2ft. to 3ft. A fine plant. (G. C. n. s., xvi. 373.) SYN. *R. Newmanii.*

R. triloba (three-lobed). *fl.-heads* small, but numerous and showy; ray florets eight, yellow, ¾in. long; disk blackish-purple. August. *l.*, upper ones ovate-lanceolate, sparingly toothed, the lower ones three-lobed, tapering at the base, coarsely serrate; those from the root pinnately parted or undivided. *h.* 2ft. to 5ft. 1699. Plant hairy, much-branched. (B. R. 525.)

RUDDLES. An old name for Marigolds.

RUDERAL. Growing in waste places or amongst rubbish.

RUDGEA (named in honour of Edward Rudge, an English botanist, who published in 1606 "Plantarum Guianæ Icones"). ORD. *Rubiaceæ.* A genus comprising about forty-five species of glabrous or pubescent, stove shrubs or small trees, natives of tropical America. Flowers mediocre or rather large, paniculate, sessile or pedicellate, rarely capitate; calyx tube ovoid or obconical; limb of five, rarely four, persistent segments or parts; corolla cylindrical or funnel-shaped, the tube usually straight and elongated, the throat naked or bearded, the limb of five, rarely four, erect or spreading lobes; stamens five, or rarely four. Leaves opposite, sub-sessile or petiolate, coriaceous; stipules often cartilaginous, sometimes thickly coriaceous and inflated. For culture of the species best known in gardens, *see* **Coffea.**

R. macrophylla (large-leaved). *fl.* cream-colour, sessile; fascicles densely clustered in globose heads; corolla segments obtuse; peduncles short. Summer. *l.* large, sub-sessile, obovate-oblong, narrowed at base. *h.* 6ft. Brazil, 1867. (B. M. 5653; F. d. S. 1720; G. C. n. s., xii. 81.)

RUDIMENTARY. Imperfectly developed; incomplete.

RUDOLPHIA (named after Charles Asmund Rudolph, 1771-1832, a botanist of Jena). ORD. *Leguminosæ.* A genus comprising two or three species of handsome, stove, twining herbs, confined to St. Dominga. Flowers red, elongated, fasciculate-racemose on axillary peduncles; calyx tubular, the two upper lobes connate, the lateral ones smaller; standard oblong, erect, inappendiculate; bracts and bracteoles small, narrow. Leaves one-foliolate, stipellate. The two species described below are probably not in cultivation.

R. rosea (rose-coloured). *fl.* scarlet, ¼in. long, in pedunculate racemes. June. Pods pubescent. *l.*, leaflet ovate-oblong, glabrous, acuminated. Branches smooth, glabrous. 1826.

R. volubilis (twining). *fl.* scarlet, 1½in. long; racemes bearing flowers from the base. July. *l.* glabrous, cordate-ovate, acuminate. Branches dotted from tubercles. 1820.

RUDOLPHŒMERIA. A synonym of **Kniphofia** (which *see*).

RUE (*Ruta graveolens*). A hardy evergreen, somewhat shrubby plant, native of Southern Europe, cultivated in gardens for its use medicinally; the leaves emit a powerful odour, and have an exceedingly acrid taste. The plant grows almost anywhere, but thrives best in a partially sheltered and dry situation. Propagation may be effected by seeds, sown outside, in spring; and by cuttings or rooted slips, taken at the same season, and inserted for a time, until well rooted, in a shady border.

RUE, GOAT'S. *See* **Galega officinalis.**

RUELLIA (named in honour of John Ruelle, of Soissons, 1474-1537, botanist and physician to Francis I.; he published a treatise, "De Natura Plantarum," in 1536).

Ruellia—*continued.*

Including *Arrhostoxylum, Dipteracanthus,* and *Stephanophysum.* ORD. *Acanthaceæ.* A genus comprising about 150 species of stove or greenhouse, pubescent, villous, or rarely glabrous, annual or perennial herbs, sub-shrubs, or shrubs, mostly American, a few being found in Africa, Asia, and Australia. Flowers violet, pale lilac, white, red, or rarely yellow or orange, sessile or sub-sessile in the axils of the leaves or bracts, sometimes solitary or fascicled, sometimes in paniculate cymes; calyx deeply five-fid or five-parted; corolla tube straight, incurved, or abruptly bent, dilated upwards; limb spreading, very oblique or sub-equal, with five ovate or rounded, twisted lobes; stamens four, included or exserted. Leaves opposite, entire or rarely toothed; bracts often narrow or small. The best-known species are described below. They are pretty, free-flowering plants, and readily thrive in any light, rich soil, with stove heat. Propagation may be effected by cuttings, inserted in similar soil, under a hand glass.

R. acutangula (acute-angled). *fl.* sessile, on axillary peduncles, 4in. to 6in. long; calyx ½in. long; corolla tube 1in. long, slightly curved; limb bright orange-scarlet, yellow at the throat, 2in. in diameter. May. *l.* 5in. to 8in. long, elliptic-ovate, acuminate, narrowed into the petiole, with many nerves sunk in the surface. Branches obtusely quadrangular. Brazil. A large herb or undershrub. (B. M. 6382.)

R. Baikiei (Dr. Baikie's).* *fl.* opposite, sessile, in a terminal panicle, composed of many-flowered, opposite racemes or spikes; corolla scarlet, over 2in. long, tubular-infundibuliform, inflated or ventricose in the middle. Winter. *l.* in opposite pairs, sometimes more than 9in. long, including the petiole, ovate-lanceolate, acuminate, attenuated at base. *h.* 3ft. West Africa, 1858. Sub-shrub. (B. M. 5111, under name of *Stephanophysum Baikiei.*)

R. ciliatiflora (fringe-flowered). *fl.* purplish-blue, handsome, two to four or six in a terminal, leafless panicle; corolla 1in. across, the tube about the same length; margins of limb beautifully dentate-ciliate. September. *l.* opposite, ovate, petiolate, the margins unequally serrate, more or less hairy; lower ones more so, and the largest. Stem herbaceous, pubescent-scabrous. *h.* 2ft. Buenos Ayres, 1838. (B. M. 3718.)

R. Devosiana (Devos'). *fl.* white, axillary; corolla tube suddenly dilated and bent at the middle. *l.* lanceolate, distantly toothed, deep green above, with the course of the veins whitish, entirely purple beneath. Stems purple. Brazil, 1877. Sub-shrub. A very effective foliage plant. (B. H. 1877, 19.)

R. elegans (elegant), of Hooker. A synonym of *R. latebrosa.*

R. formosa (beautiful). *fl.* on axillary, alternate, straight peduncles, two or three times longer than the leaves; corolla fine scarlet, showy; tube 1½in. long; two upper lobes of limb conjoined half-way up. Summer. *l.* opposite, ovate, more or less pointed, rounded at the base, covered on both sides with short hairs; petioles not half as long as the leaves. *h.* 2ft. Brazil, 1808. Shrub. (B. M. 1400.)

R. Herbstii (Herbst's).* *fl.* three to five together, 3in. long, calyx red-purple, ¾in. long; corolla pale rose-purple, abruptly bent; limb of five white, patent or recurved, bilobed divisions. September. *l.* deep dull green, the upper ones of a dull pale purple beneath, 5in. to 7in. long, 1¾in. to 2in. broad, lanceolate, acuminate, obscurely sinuated, serrated. *h.* 3ft. Brazil, 1859. An erect shrub or sub-shrub. (B. M. 5156, under name of *Dipteracanthus Herbstii.*)

R. latebrosa (secret). *fl.*, corolla salver-shaped; tube white, purplish upwards, curved; limb very bright blue, of five emarginate lobes. Summer. *l.* opposite, pubescent, ovate, acuminate, coarsely serrated, tapering gradually into a footstalk nearly equalling the leaf in length; those at the tips of the branches reduced to sessile bracts. *h.* 2ft. East Indies, 1834. Annual. (B. M. 3389, under name of *R. elegans.*)

R. longifolia (long-leaved). *fl.* vermilion; corolla segments retuse. July. *l.* oblong-lanceolate or oblong, attenuated at both ends, repand or repand-denticulate. *h.* 2ft. to 3ft. Brazil, 1820. A glabrous, perennial herb.

R. macrantha (large-flowered). *fl.* of a rosy-purple colour, with a light, beautifully-veined throat, trumpet-shaped, large, axillary. *l.* long-lanceolate. 1883. A handsome, decorative shrub. (R. H. 1881, p. 410.)

R. macrophylla (large-leaved).* *fl.* handsome, sub-secund, in spreading, di-trichotomous panicles; corolla bright scarlet, 2in. to 3in. long, the tube curved, broader upwards, but laterally compressed; limb large; lobes soon reflexed. Summer. *l.* opposite, petiolate, ovate, acuminate, penninerved, reticulated, the margins sinuated or indistinctly toothed, puberulous. *h.* 3ft. to 4ft. New Grenada, Mexico, &c., 1844. Plant shrubby below, herbaceous above. (B. M. 4448 and B. R. xxxii. 7, under name of *Stemonacanthus macrophyllus.*)

Ruellia—*continued.*

R. paniculata (panicle-flowered). Christmas Pride. *fl.* purple, in axillary, opposite, dichotomously divaricate cymes; corolla funnel-shaped, nearly ½in. long. August. *l.* oblong-oval, attenuated at both ends, decurrent into the petioles, hairy-pubescent or glandulose. *h.* 3ft. West Indies, 1768. Herbaceous perennial. (B. R. 585.)

R. Portellæ (Portella's).* *fl.* axillary, solitary, sessile; calyx segments nearly ½in. long, hairy; corolla bright rose-pink, hairy externally, 1½in. to 1¾in. long, with a slender tube, dilated above the middle, and a flat limb 1in. in diameter. Winter. *l.* 2in. to 3in. long, very uniform, elliptic-ovate, sub-acute, narrowed into slender petioles one-half their own length, red-purple beneath. *h.* 1ft. Brazil, 1879. A free-flowering, much-branched, erect, annual or perennial herb. (B. M. 6498.)

R. Purdieana (Purdie's). *fl.* terminal, in pairs, each remarkable for a large pair of bracts at the base; calyx small; corolla of a fine, deep crimson-lilac, with a much-elongated tube, and a limb of five waved segments. Various seasons. *l.* opposite, petiolate, ovate, acuminate, penninerved. *h.* 1ft. to 1½ft. Jamaica, 1844. A glabrous shrub or under-shrub. (B. M. 4298; P. M. B. xvi. 129.)

R. rosea (rose-coloured). *fl.* in terminal, corymbose, glandular-hairy spikes; corolla 1in. long. Summer. *l.* lanceolate, covered with canescent wool beneath, 3½in. to 7in. long, acuminate, rigid. Brazil, 1818. Shrub.

R. Schaueriana (Schauer's). *fl.* axillary, sessile; corolla with a very long, funnel-shaped, curved tube, veiny and lilac above, pale and almost white towards the base; limb of five purplish-lilac, rounded lobes. Summer. *l.* opposite, ovate, bluntly acuminate, penninerved, pale beneath. *h.* 2ft. to 3ft. Brazil, 1844. A low shrub, with the young branches herbaceous. (B. M. 4147; B. R. xxxii. 45, under name of *R. lilacina.*)

R. solitaria (solitary). *fl.* geminate, nearly sessile; corolla rather pale purplish-lilac, with a few deeper lines or streaks; tube long, funnel-shaped, the lower half white. Winter. *l.* opposite, 1½in. to 2in. long, oblong or ovate-lanceolate, short-petioled, obtusely acuminate, pale, and sometimes purplish beneath. *h.* 2ft. Brazil. Shrub or under-shrub. (B. M. 5106, under name of *Dipteracanthus calvescens.*) The plant figured under the name of *Strobilanthes lactatus*, in B. M. 4366 and F. d. S. 346, is a form with the foliage bearing a central blotch of white.

R. speciosa (showy).* *fl.* of a rich scarlet colour, axillary, solitary, sub-sessile; corolla large, funnel-shaped, 3½in., or thrice as long as the calyx. July. *l.* oval; lower ones obtuse, with a slight mucrone; upper ones acute, glabrous, slightly acute at base, petiolate. *h.* (in its native place) sometimes as much as 20ft. Brazil, 1859. Shrub, with flexuous, dependent branches. (B. M. 5414, under name of *Dipteracanthus affinis.*)

R. spectabilis (remarkable).* *fl.* purplish-blue, marked with dark veins, sessile, or nearly so, axillary in twos, large and very showy; calyx deeply cut; corolla tube funnel-shaped, curved; limb very large, with five rounded lobes. August. *l.* opposite, moderately large, nearly sessile, ovate, acuminate, attenuated at the base, ciliated on the margins, slightly pubescent above. *h.* 2ft. or more. Peru, 1849. A slightly pubescent, annual or perennial herb. (B. M. 4494, under name of *Dipteracanthus spectabilis.*)

RUE, WALL. A common name for **Asplenium Ruta-muraria** (which *see*).

RUFOUS. Pale red, mixed with brown.

RUGOSE. Covered with wrinkled lines, the intervening spaces being convex; *e.g.*, the leaves of garden Sage.

RUIZIA (named in honour of Don Hippolite Ruiz, author, in conjunction with Pavon, of "Floræ Peruvianæ et Chilensis"). ORD. *Sterculiaceæ.* A genus consisting of only three species of stove shrubs, natives of Bourbon. Calyx five-parted; petals five, unequilateral, flat, persistent; staminal cup bearing twenty to thirty fertile stamens; peduncles axillary, cymosely many-flowered. Leaves palmi-nerved, entire, lobed, or nearly dissected, tomentose beneath. Two of the species have been introduced, and are worth growing. They thrive in a compost of loam, peat, and sand. Propagated by cuttings, which will root freely, if inserted in similar soil, under a hand glass, in heat.

R. lobata (lobed-leaved). *fl.* pale reddish. May. *l.* cordate, crenated, three to five-lobed, oblong, hoary beneath, smooth above; middle lobe longest and acuminated. *h.* 6ft. 1818.

R. variabilis (variable-leaved). *fl.* pale reddish. May. *l.* of the flowering branches palmatifid, those of the sterile ones palmately parted, hoary beneath. *h.* 10ft. 1792.

RUIZIA (of Ruiz and Pavon). A synonym of **Peumus** (which *see*).

RULINGIA (dedicated to John Philip Ruling, who wrote, in 1766, an essay on the Natural Orders of Plants). ORD. *Sterculiaceæ.* A genus comprising fifteen species of greenhouse, stellate-tomentose shrubs or under-shrubs; one is a native of Madagascar, and the rest are Australian. Flowers usually white, small, cymose; calyx five-fid; petals five, broadly concave at base, ligulate above; stamens shortly connate at base; cymes axillary or opposite the leaves, rarely terminal. Leaves entire, toothed, or lobed. The species have no great beauty, the flowers not exceeding ¼in. in diameter. Those described below are from Australia, and thrive in a compost of loam, peat, and sand. Ripened cuttings will root in either sand or soil, if covered with a bell glass.

R. corylifolia (Corylus-leaved). *fl.* in dense sessile cymes, forming dense, terminal, leafy corymbs. April. *l.* broadly ovate, 2in. to 3in. long, irregularly toothed or broadly lobed, wrinkled, green and roughly pubescent above, more densely tomentose-villous or pubescent beneath. *h.* 2ft. 1824. (B. M. 3182.)

R. hermanniæfolia (Hermannia-leaved). *fl.* in shortly pedunculate cymes. April. *l.* usually narrow-oblong, ¼in. long, in luxuriant specimens often ovate-lanceolate, or with short, broad basal lobes, always obtuse, crenate, much wrinkled, white-tomentose beneath. *h.* 2ft. or more. 1818. (L. B. C. 1564, under name of *Lasiopetalum dumosum.*)

R. pannosa (cloth-leaved). *fl.*, cymes shortly pedunculate. April. *l.*, mature ones shortly petiolate, ovate-lanceolate or lanceolate, 2in. to 3in. or more long, toothed, rounded or cordate at base, scabrous-pubescent above, with impressed veins, densely velvety or hirsute beneath; on young plants they are often broader and three to five-lobed. *h.* 2ft. 1819. (B. M. 2191; A. B. R. 603, under name of *Commersonia dasyphylla.*)

R. parviflora (small-flowered). *fl.* small; cymes shortly pedunculate. April. *l.* very shortly petiolate, ovate or ovate-lanceolate, obtuse, rarely 1in. long, deeply crenate, and mostly lobed, with undulated, often crisped margins, glabrous or nearly so above, hirsute beneath. Branches prostrate or ascending, 6in. to 18in. long. 1868. A low shrub or under-shrub.

RULINGIA (of Ehrhart). A synonym of **Anacampseros** (which *see*).

RUMEX (the old Latin name used by Pliny). Dock. ORD. *Polygonaceæ.* A large genus of perennial or rarely annual herbs, sometimes sub-shrubs, rarely tall shrubs, distributed thoughout all temperate climates. About 130 species have been enumerated, but the number is estimated by some authors at less than 100. Flowers fasciculate in the nodes; fascicles axillary or disposed in terminal racemes or panicles. Leaves sometimes all radical, sometimes alternate on the stems and branches. The species are mostly worthless, and, in some cases, very troublesome, weeds. Eleven are natives of Britain, among them may be mentioned *R. Acetosa* (Sorrel), the leaves of which have been used as Spinach, and *R. Patientia* (Herb Patience).

RUMINATED. Pierced by irregular passages, as if chewed; *e.g.*, the albumen of a nutmeg.

RUNCINATE. Saw-toothed, or sharply incised, the teeth or incisions retrorse.

RUNNER. A prostrate, filiform branch or stem, rooting at its extremity or elsewhere; *e.g.*, the Strawberry.

RUNNERS, PROPAGATION BY. *See* **Propagation.**

RUPALLEYA. A synonym of **Stropholirion** (which *see*).

RUPESTRIS, RUPICOLA. Growing on rocks or in rocky places.

RUPPIA (named after H. B. Ruppius, a botanical author). ORD. *Naiadaceæ.* A genus consisting of one or more species of hardy, tufted, aquatic herbs, inhabiting the shores of temperate and tropical regions. *R. maritima* and its sub-species *rostellata* are natives of Britain; they have no horticultural value.

RUPTURE WORT. *See* **Herniaria glabra.**

RUPTURING. Bursting irregularly.

RUSCUS (the old Latin name, used by Virgil and Pliny). Butcher's Broom. ORD. *Liliaceæ*. A small genus (two or three species) of hardy plants, with erect, branched, slightly woody stems, natives of Europe and the whole Mediterranean region, from Madeira to the Caucasus. Flowers small, usually on the face of the cladode; pedicels short, articulated at the apex. Berries globose, pulpy, indehiscent. Cladodes leaf-like, alternate or scattered, ovate or ovate-lanceolate, acute or pungent-pointed, rigidly coriaceous. The species thrive in common soil, and may be propagated by root-suckers.

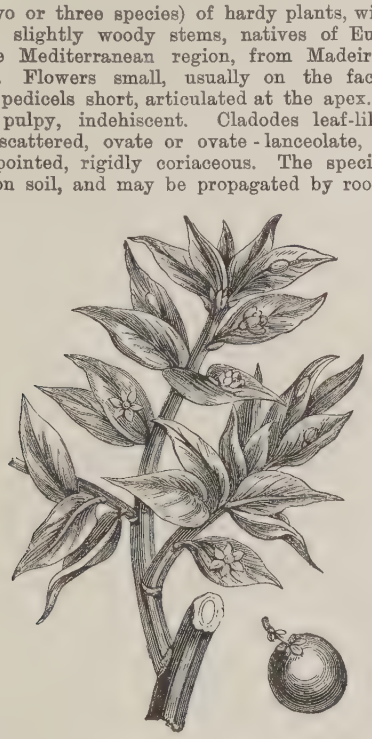


FIG. 399. FLOWERING BRANCHLET AND DETACHED FRUIT OF RUSCUS ACULEATUS.

R. aculeatus (prickly). Common Butcher's Broom; Pettigree or Pettigrue. *fl.* one or two, bracteate and bracteolate. February to April. *fr.* bright red, rarely yellow, ¼in. in diameter. *cladodes* ½in. to 1½in. long, ovate, rigid, spinescent, twisted at the base. Stems 10in. to 2ft. high, erect. Europe (Britain), North Africa &c. See Fig. 399. (Sy. En. B. 1516.)

R. androgynus (hermaphrodite). A synonym of *Semele androgyna*.

R. Hypophyllum (leaf-under-leaf).* Double Tongue. *fl.* five or six in an umbel, disposed in the middle of the lower cladodes. May and June. *fr.* red, ¼in. to ⅜in. thick. *cladodes* oblong or oblong-lanceolate, 3in. to 5in. long; upper ones alternate; lower ones opposite, ternate, or verticillate, distinctly costate. *h.* 1ft. to 1½ft. Mediterranean region, 1640. (B. M. 2049.) *R. Hypoglossum* is regarded, by Mr. Baker, as a form of this species.

R. racemosus (raceme-flowered). Alexandrian Laurel. *fl.* greenish-yellow, hermaphrodite, produced at the ends of the branches. May. *fr.* red, with a round, coriaceous, white disk at the base. *cladodes* oblong, acute, about 2in. long, rounded at base, smooth, lucid-green, alternate, sessile. *h.* 4ft. Portugal, 1739. Evergreen shrub. (W. D. B. 145.) *Danae racemosa* is the correct name of this plant.

RUSH. *See* **Juncus.** The name is also commonly applied to many species of allied and other genera.

RUSH FERN. *See* **Schizea.**

RUSH, FLOWERING. *See* **Butomus.**

RUSH LILY. *See* **Sisyrinchium.**

RUSSELIA (named in honour of Alexander Russel, M.D., F.R.S., author of a "Natural History of Aleppo," 1756). ORD. *Scrophularineæ*. A genus comprising four or five species of showy-flowered, stove, evergreen shrubs, natives of Mexico and Central America. Calyx deeply five-fid or five-parted, with closely imbricated segments; corolla scarlet, with a cylindrical tube and a sub-bilabiate, five-fid limb; stamens four; cymes dichotomous, bracteate, many-flowered or reduced to one. Leaves opposite or whorled; those on the branchlets (which are often nodding

Russelia—*continued.*

or pendulous) frequently reduced to small scales. All the species introduced are described below. They thrive in light, rich soil. Propagation may be readily effected by cuttings, inserted in similar soil, under a glass, in heat.

R. floribunda (bundle-flowered). A synonym of *R. rotundifolia*.

R. juncea (Rush-like).* *fl.* in loose, remote-flowered racemes; corolla 1in. long; peduncles elongated. July. *l.* linear, lanceolate, or ovate, small; those on the branchlets minute and scale-like. Branches twiggy, rush-like, pendulous at apex. *h.* 3ft. to 4ft. Mexico, 1833. (B. 220; B. R. 1773.)

R. multiflora (many-flowered). A synonym of *R. sarmentosa*.

R. rotundifolia (round-leaved). *fl.* like those of *R. sarmentosa*; peduncles many-flowered. June. *l.* sessile, orbicular, deeply cordate at base, the cauline ones 2in. to 4in. long and broad, reticulate-veined beneath, softly pubescent, closely sessile or semi-amplexicaul. *h.* 4ft. Mexico, 1824. SYN. *R. floribunda*.

R. sarmentosa (sarmentose).* *fl.* falsely whorled or loosely cymose; corolla more or less bearded on the throat below the lower lip; peduncles from three or four to thirty or forty-flowered, axillary and remote, or in crowded racemes. July. *l.* variable, sometimes opposite or in whorls of three or four on the same specimen, cuneate or sub-cordate at base, acuminate and acute or obtuse, serrate or crenate, glabrous or slightly hairy. *h.* 4ft. Central America, 1812. SYNS. *R. multiflora* (B. M. 1528), *R. ternifolia*.

R. ternifolia (ternate-leaved). A synonym of *R. sarmentosa*.

RUST. Under this popular name, Fungi of more than one group are included. The true Rusts, from which the name has been derived, belong to the *Uredineæ* (*see* **Puccinia**), to the forms distinguished as *Uredo*, *Cœoma*, *Trichobasis*, *Æcidium*, and *Lecythœ*, formerly considered true genera, but now regarded only as stages in the development of *Puccinia* and of allied genera. The conidia, or spores, in these forms are small, round or oval cells, thrown off from the ends of the threads of mycelium, either singly or in rows. They fall off readily, and the surfaces of the diseased plants, and of any body that is rubbed on them, becomes covered with the spores, like iron rust in colour and general appearance. They are, accordingly, known as True Rusts or as Red Rusts. *Puccinia* includes a very large number of species, some of which (*e.g.*, *P. graminis* and allies) are called Mildews when occurring on Wheat and other cereals. The more common name for the species of *Puccinia* and of *Phragmidium* is Brands; but, occasionally, they are styled Black Rusts. For an account of all these forms, *see* **Phragmidium** and **Puccinia.**

White Rusts differ much from *Uredineæ*, though by some they are associated with them, from the fact that they produce conidia, which break away from the mycelium, and which are grouped in patches, much as in some forms of *Uredineæ*. Like these also they cover bodies rubbed against them with a powdery coating of conidia; but the latter are white, not rusty-red. The White Rusts belong to the genus *Cystopus*, and are nearly related to **Peronospora** (which *see*). There are few species in the genus; and only one, *C. candidus*, is really hurtful in gardens in this country. It grows on the leaves, stems, and flowers of many of the *Cruciferæ*, causing distortions of these organs, and especially of the flowers, which become much swollen, and remain sterile. It may be found on Cabbage, Turnip, Radish, Horseradish, and many wild *Cruciferæ*, *e.g.*, Shepherd's Purse and Watercress. It is common in North America as well as in Europe. A microscopic examination of a section through one of the white spots, which are plentifully scattered over the diseased organs, shows a layer of mycelium, from which rise branches, each of which bears on its tip a beadlike row of conidia. These fall off one after the other. When they fall into water, the contents break up into five or six zoospores, like those in *Peronospora*. These bodies escape by a hole, which opens at one end of the conidium, and move about for a time in the water by means of two hairs or cilia. Afterwards, they settle down, and push out a mycelium-

Rust—*continued.*

tube, which, on any suitable part of a plant fitted for the nourishment of the Fungus, makes its way in through a stoma, and reproduces the parasite. This process goes on during the summer; but, in autumn, "resting-spores" are formed in the tissues of the host-plants, to pass the winter in a quiescent state, and to propagate the species next summer, when food can be again obtained. These resting-spores are very similar in mode of production, and in appearance, to those of *Peronospora*. On each of two threads of mycelium, lying among the tissues of the host-plant, a branch is formed. One bears a nearly globular cell, the oogonium, the contents of which shrink a little, and lie loose in the cell, forming the oosphere. The other branch ends in a thickened cell, the antheridium, much smaller than the oogonium. It lies in contact with the latter, into which some of its contents pass through a narrow tube. The oosphere is thus fertilised, and becomes the oospore or resting-spore, distinguished by the possession of a thick, brown cell wall, which bears numerous warty ridges, and is well fitted to resist the cold of winter and other unfavourable influences. In spring, the contents of the resting-spore break up to form a large number of small cells, each capable of reproducing the Fungus in a suitable host-plant. These are set free by the bursting of the cell wall of the resting-spore.

Remedies. The only remedy available is, as far as possible, to limit the multiplication of the Fungus by the removal and burning of all plants, whether weeds or cultivated species, that show it, and by not sowing *Cruciferæ* on any piece of ground for a year or two after diseased crops have been removed from it.

RUSTIC WORK. A term applied to erections or ornaments made of rough or undressed timber and other similar materials as nearly as possible in their natural state. Undoubtedly, the best examples are those that show the least mark of the workman's tools. The materials for Rustic Work are obtained from woods and forests, heaths and swamps, and vary in character and appearance, according to the locality in which they are found. As the unshapely block of stone or marble from the quarry becomes, in the hands of the sculptor or architect, a thing of beauty, so may the gnarled and knotted branch, and the decayed Pollard-tree, the slender Larch and the smooth Hazel, the Heather of the mountain and the moss of the fen, the Sedges and Reeds by the river-bank, and the exquisite cones of the Fir-tree, each and all, in the hands of one who has true taste, be manipulated into beautiful and useful adornments for our gardens. Much of the material for the work may be found on most estates, and often amongst that which is either consigned to the fire or allowed to perish where it stands. Where alterations or improvements are being made in grounds, especially on estates which are being cut up for building purposes, it often happens that there are old Apple, Pear, and other trees very suitable for the work, which have to be removed; or a Thorn or a Yew-tree, &c., may be uprooted by the wind, or timber is being felled, and from these much material may be selected.

Failing crooked and distorted branches and loppings, the thinnings from Oak and Larch plantations, and Hazel rods from the copse, can be used for the lighter portions of Rustic Work. Where old hedge-row "Pollards" abound, they form excellent material for ferneries or alpine mounds. The rough bark from Oak, Chestnut, Larch, &c., is useful, and so are defective trunks, or branches of large trees, cut into short lengths or transverse sections for paving floors; these sections may be laid in patterns, but are more effective when they vary in diameter, giving less formal effect than when they are of equal size. An old Thorn hedge that has been for many years clipped by the shears, supplies excellent material

Rustic Work—*continued.*

for the smaller articles, such as vases, flower-stands, tables, and baskets; and the cones of Firs are particularly serviceable for the same purpose. In cases where no suitable timber can be felled, it often happens that a judicious thinning-out of branches may take place without the least detriment or disfigurement to the trees. Heather may be collected, bound in bundles, and closely stacked some time before using, as it then makes a closer thatch; the same remark applies to Reeds and Sedges. There are various mosses to be found on heaths, and in swamps, plantations, woods, &c., which should be carefully collected, and kept as straight as possible, to be used either for simply filling up chinks and crevices to exclude draughts, or as fillings in carpet-like patterns for the inside of summer-houses. In using mosses for this purpose, if above a seat or bench, the moss-work should be kept above the head-line of persons when seated. Below that line, a lining of split Hazel rods, with the bark side outwards, worked in diagonal, diamond, or other patterns, may be used. For moss-work of this description, as well as for the Hazel patterns, a comparatively smooth surface must be provided as foundation. Sometimes, this is done by making the back, sides, and ceiling of a summer-house, of ordinary carpenter's framework and boarding, when the outside may be covered with coarse bark, or slabs with the bark preserved, and the inside covered with moss, &c. The same object can be attained by sawing longitudinally through the trunks of moderate-sized trees, the bark adhering, and then setting them side by side vertically, to form the surface on which to work the moss pattern. The cones of the Stone and Cluster Pines are particularly useful for forming cornices, caps, &c., to Rustic buildings, and the smaller cones of the Larch and Scotch Fir may be employed for festoons, and in forming the interior decorations.

The disposition of Rustic Work, no less than its construction, requires an artistic eye and good taste. To speak in general terms, it should seldom come much "to the front"; that is to say, suitable positions for it will but seldom present themselves very near to the principal windows of a mansion—its place, for the most part, being in nooks and corners of shrubberies, plantation walks, the borders of woods, or in the wild garden. Let us imagine a situation, shut off from the more cultivated grounds. Such a position might have a Rustic gate flanked by a Rustic screen, on which *Cratægus Pyracantha*, or similar evergreens are trained; a broad, gravelled path, on each side of which are Rustic arches, with here and there an arch thrown over the path, and covered with Roses, Honeysuckle, Jasmine, &c., forming a vista, at the end of which a Rustic summer-house, its porch or verandah covered with Clematis, could be placed. On either side of the main walk, a breadth of turf, with a ribbon scroll of Ivy, so designed as to afford suitable positions for Rustic baskets or pyramids might be added, and the whole surrounded by a densely-planted, raised bank, for effectual shelter from cold winds. On the face of the bank, next the garden, logs and blocks may be interspersed, to afford receptacles for Ferns, alpine plants, or trailing shrubs. Such a garden might be formed in any existing mass of shrubbery that is large enough for the purpose, and would be an interesting addition to many already fine gardens. With smaller gardens, and where the house has no particular architectural features, a Rustic verandah, with roof of tiles or shingles, covered all over with Jasmine, Roses, Honeysuckle, &c., often gives a particularly cosy appearance. If in front of this there is room for a gravelled walk, a kind of terrace, and the ground lends itself to the formation of a grass slope, with a step or two down to the lawn or flower-garden, here is a pretext for a Rustic balustrade, with vases and Rustic steps, which will, at the same time, form a trellis for the smaller kinds of climbing plants. At some point, just out of sight of the

Rustic Work—*continued.*

windows (and if commanding a view of some fine scenery, so much the better), the Rustic arbour or summer-house may be placed, having its seat and table. If backed by shrubs, it will have a more snug appearance, and if flanked or extended at the base by partially plunging a few rough logs in the ground, interspersing them with hardy, evergreen Ferns and spring flowers, the charm of the picture would be enhanced. Should a boundary fence anywhere cross the view, as in the division of the lawn from the park or paddock, it may be somewhat masked by placing a line of Rustic arches across, and allowing the climbing plants upon them to assume a somewhat careless growth. For such a purpose, good, sound Larch poles are useful, as they will stand for several years.

In places where there is a large expanse of lawn, with glades of turf and spreading trees, and masses of shrubbery, Rustic beds, formed like baskets, vases, and pyramids, are pretty objects, if placed with judgment, and are very effective if associated with Ivy or Ferns.

Rustic buildings, when substantially constructed, are very appropriate, and, as a rule, harmonise better with the scenery than any of a more formal character, when used as boat-houses, rests and shelters in woods, gamekeepers' huts, &c. Rustic Work is also well adapted to foot-bridges over small streams in gardens, parks, and woods. It is better, in order to make such structures more secure, to have a pair of iron girders concealed beneath the woodwork. The planks for the pathway should be of some durable wood without sap; otherwise, they may soon rot, and cause accidents.

Any pits or hollows that occur in shrubberies or plantations, if overhung by shrubs or large trees, will often present a suitable site for a fernery; and where natural stone does not abound for making rockwork, an excellent effect may be obtained by the use of sufficiently massive logs. Any steps that may be required can be made from split sections of good-sized trees, placing them so that the split side forms the tread, and the bark side the riser. The "tods" of old Pollard-trees, and even sections of hollow trunks, when placed in suitable positions in woodland walks or drives, make good receptacles for trailing plants, or the better kinds of hardy Ferns. In such walks, and also in parks, sections of rough timber (provided the top is smoothed and very slightly bevelled, so as to throw off the rain), when placed in twos and threes at the base of spreading trees, form agreeable resting-places. Care must be taken to have them of variable sizes, so as to avoid formality.

The Rustic chair, as a rule more picturesque than useful, should be sparingly used, or at least only where apparently needed, and not too near the mansion, or in highly-dressed grounds.

RUTA (*Rute* was the old Greek name, probably from *ruomai*, to preserve; in allusion to the effects of the plant on health). Herb of Grace; Rue. Including *Haplophyllum* (or *Aplophyllum*). ORD. *Rutaceæ*. A genus comprising about forty species of hardy or half-hardy, strong-smelling, gland-dotted, perennial herbs or sub-shrubs, broadly scattered over the Mediterranean region and Western and Central Asia. Flowers yellow or greenish, sometimes cymose; calyx short, four or five-lobed or parted, persistent; petals four or five, imbricated, often toothed or ciliated; torus thick; stamens eight to ten; corymbs or panicles terminal, many-flowered, leafy-bracted. Leaves alternate, simple, trifoliolate, pinnatisect or decompound. Few of the species are of any horticultural value; all that call for mention are described below, and are hardy sub-shrubs, except where otherwise indicated. They are of easy culture in any light, rich soil. Propagated by seeds, or by cuttings. For culture, &c., of *R. graveolens*, *see* **Rue.**

Ruta—*continued.*

R. albiflora (white-flowered). *fl.* white; petals entire, shorter than the stamens; branches of panicle bracteate. July to September. *l.* supra-decompound; leaflets obovate, glaucous, pubescent, somewhat auricled, the terminal one large, obcordate. *h.* 2ft. Nepaul. An elegant, half-hardy sub-shrub, clothed with glandular pubescence. (H. E. F. 79.) *Bœnninghausenia albiflora* is the correct name of this plant.

R. angustifolia (narrow-leaved). A synonym of *R. Chalepensis.*

R. bracteosa (bracteate). *fl.*, petals ciliated. June to September. *l.* pinnate; leaflets oblong, on short stalks; the terminal one largest, the lower ones cut into three to five leaflets. *h.* 3ft. South Europe, &c., 1772. SYN. *R. macrophylla.*

R. chalepensis (Aleppo). *fl.*, petals ciliated; bracts small, ovate. June to September. *l.* supra-decompound, four times longer than broad; leaflets oblong-cuneate, almost equal, very glaucous. *h.* 2ft. Mediterranean region, 1722. SYN. *R. angustifolia* (B. M. 2311).

R. graveolens (strong-scented). Common Rue; Countryman's Treacle; Herb of Grace. *fl.*, the first one opening having usually ten stamens, the rest only eight; petals entire, or a little toothed. June to September. *l.* supra-decompound; leaflets oblong, the terminal one obovate. *h.* 3ft. South Europe, 1562. *variegata* is a useful garden form, having foliage spotted with white.

R. macrophylla (large-leaved). A synonym of *R. bracteosa.*

R. patavina (Paduan). *fl.* yellow, with a green central rib, in a dense corymb; petals glabrous, oblong, obtuse, attenuated at base; pedicels slender, scarcely as long as the flowers. June and July. *l.* glabrous; lower ones attenuated at base, oblong-spathulate; the rest trisected, with oblong or linear segments. Stem dwarf, simple, densely leafy. Orient, 1819.

R. suaveolens (sweet-smelling). *fl.* yellow, corymbose, having the smell of those of *Primula officinalis*; calyx a little fringed; petals obovate. June to September. *l.* entire, spathulately lanceolate, glaucous, smoothish. *h.* 2ft. Tauria, 1800. (B. M. 2254, under name of *R. linifolia grandiflora.*)

RUTACEÆ. A natural order of gland-dotted shrubs or trees, very rarely herbs, scattered over the temperate and warmer regions of the globe, occurring most copiously in South Africa and Australia. Flowers usually hermaphrodite; sepals four or five, imbricated, free or connate; petals four or five, hypogynous or perigynous, broadly imbricated, rarely valvate; stamens inserted at the base or on the margins of the torus, four or five, or eight or ten, very rarely fewer or indefinite; style short or elongated, distinct or connate; inflorescence variable, very rarely spicate or umbellate, in most cases cymose and axillary. Fruit a capsule or berry, rarely a drupe. Leaves exstipulate, usually opposite, simple or often compound, one, three, or five-foliolate or pinnate, frequently entire, occasionally serrulated; petioles sometimes biglandular at base. *Ruta graveolens* (Rue), grown in most gardens, is remarkable for its strong smell and acrid taste. *Citrus* is the most celebrated genus, on account of its fruits (Orange, Lemon, Lime, &c.); a volatile oil, obtained by distillation of the flowers and epicarp, and dissolved in alcohol, produces the well-known Eau de Cologne. The berries of some other genera from China and Japan are edible, as *Ægle Marmelos*, *Cookia punctata*, *Glycosmis citrifolia*, *Triphasia trifoliata*, &c. The order comprises about eighty-three genera and 650 species. Examples: *Citrus*, *Correa*, *Crowea*, *Ruta.*

RUTILANS. Deep red, with a metallic lustre.

RUYSCHIA (named in honour of Fred. Ruysch, Professor of Botany at Amsterdam; he died in 1731). SYN. *Souroubea.* ORD. *Ternströmiaceæ.* A genus comprising about eight species of stove, epiphytal or climbing shrubs, rarely arborescent, natives of tropical America. Flowers in terminal, often elongated racemes, supported by sessile, trilobed bracts at the tips of the pedicels; sepals five, closely imbricated; petals five, imbricated, connate at base; stamens five; bracteoles two, sepaloid. Leaves entire, coriaceous. *R. clusiæfolia*, the only species introduced, is an interesting under-shrub. It will thrive in a compost of vegetable mould and loam. Ripened cuttings will root freely if inserted in sand, under a bell glass, in heat.

Ruyschia—*continued.*

R. clusiæfolia (Clusia-leaved). *fl.* purple; bracts scarlet, dotted with red, obovate, acute, thick, deflexed, concavo-convex; racemes terminal, many-flowered, about 1ft. long; peduncles short. June. *l.* alternate, obovate, thick, shining, about 4in. long. *h.* 4ft. Guiana and the Caribbee Islands, 1823.

RYANIA (named after John Ryan, M.D., F.R.S., a correspondent of Vahl). SYN. *Patrisia.* ORD. *Bixineæ.* A genus comprising about half-a-dozen species of stove, stellately-pubescent trees, natives of tropical America. Flowers axillary, often showy, solitary or sub-fasciculate; sepals five, lanceolate or oblong, imbricated, persistent; petals absent; stamens indefinite Leaves entire, penni-nerved and transversely venulose, not dotted. *R. speciosa*, the only species introduced is a beautiful shrub. It thrives in a compost of peat and loam, and may be increased by ripened cuttings, inserted in sand, under a glass, in heat.

R. speciosa (showy). *fl.* somewhat cream-coloured, large; peduncles one-flowered. August. *l.* green on both surfaces, bearing stellate hairs on the ribs beneath. *h.* 10ft. West Indies, 1823.

RYMANDRA. A synonym of **Knightia** (which *see*).

RYSSOPTERYS (from *ryssos*, wrinkled, and *pteri*, a wing; alluding to the form of the wing of the fruit). ORD. *Malpighiaceæ.* A genus comprising about half-a-dozen species of slender, twining, stove or greenhouse shrubs, natives of the Indian Archipelago and Australia. Flowers whitish; calyx five-parted; petals scarcely clawed; stamens ten, all perfect; inflorescence terminal or falsely axillary, corymbiform; pedicels thickened above. Samaras one to three, expanded into broad wings at the apex, which are laterally tubercled. Leaves opposite, or nearly so, entire, the margins gland-bearing beneath; petioles slender, biglandular at the apex; stipules rather large. *P. microstema*, the only species yet introduced, requires stove heat; it should be grown in a compost of fibry peat and sandy loam. Propagation may be effected by cuttings, inserted in sand, under a bell glass, in bottom heat.

R. microstema (small-anthered). *fl.*, petals three or four times longer than the calyx; anthers minute; inflorescence equalling, or slightly exceeding, the leaves. August. *l.* broadly ovate, 3in. to 5in. long, 2¼in. to 3in. broad, somewhat cordate, mucronate, slightly sinuated on the margins, greyish-pubescent beneath. Java, 1820.

RYTIDOLOMA. A synonym of *Dictyanthus.*

RYTIGINIA. A synonym of **Vangueria** (which *see*).

SABADILLA. A synonym of **Schœnocaulon** (which *see*).

SABAL (said to be a native name in South America; but Adanson, who originated the genus, gives no explanation). Some of the species were formerly included under *Chamærops* and *Corypha.* ORD. *Palmæ.* A genus embracing six species of dwarf, tall, or nearly stemless, stove, greenhouse, or half-hardy, unarmed palms, inhabiting tropical and sub-tropical America. Flowers white or greenish, small, glabrous; spathes tubular; spadices large, elongated, decompound, at first erect, with slender, decurved or pendulous branches and branchlets; bracts and bracteoles minute. Fruit black, small or mediocre. Leaves terminal, orbicular or cuneate at base, flabellately multifid; segments linear, bifid, induplicate in vernation; rachis short or elongated; petioles concave above, the margins acute and unarmed. The species, most of which are highly ornamental, succeed in a light loamy soil. A few suckers are sometimes emitted; these should be taken off when about 1ft. long, and, if they have no roots, must at first be carefully nursed. Seeds, however, are by far the best means of propagation.

Sabal—*continued.*

S. Adansonii (Adanson's).* Dwarf Palmetto. *fl.*, petals united at the base; style thick; spadix erect, 3ft. to 6ft. high, smooth, slender. June and July. *fr.* black, ¾in. in diameter. *l.* circular in outline, glaucous, fan-shaped, slightly pinnatifid, 2ft. to 3ft. high; divisions twenty to thirty, slightly cleft at apex, sparingly filamentous at the sinuses; petioles stout, concave, smooth-edged, shorter than the leaves. Trunk short, buried in the earth. Southern United States, 1810. Greenhouse or half-hardy. (B. M. 1434.)

S. Blackburniana (Blackburn's).* Fan or Thatch Palm. *fl.*, spadix rising from the sinus of the leaf, spreading, 4ft. to 5ft. long, glabrous, alternately branched; peduncle simple and compressed below. *l.* twenty to thirty, forming a sub-globose tuft, cordate-sub-orbicular, 5ft. to 6ft. long; segments of adult leaves about eighty, ensiform, long-acuminate, more or less deeply bifid at apex, the lower ones connate about two-thirds, the upper ones one-third, their length; petioles arcuate-spreading, 6ft. to 8ft. long, very convex at back, the margins acute and unarmed. Trunk cylindrical, nearly 1ft. in diameter, slow-growing, at length 20ft. to 25ft. high. Bermudas, 1825. This is admirably suited for a window plant when small, and for the sub-tropical garden in summer. SYN. *S. umbraculifera* (of Martius).

S. cœrulescens (bluish). *l.* (known only in the young state) elongated, linear-lanceolate, with a plicate surface and a bluish or glaucous tinge of green, which is most strongly marked on the under surface. West Indies (?), 1875. Greenhouse.

S. mauritiæformis (Mauritia-like). Savana Palm. *fl.*, spadix exceeding the leaves, the branches paniculate. *fr.* black, about the size of a pea. *l.* 12ft. in diameter, sub-orbicular, glaucous beneath, multifid to the middle, with loose fibres between the bifid lobes; petioles 7ft. to 8ft. long. Trunk 1ft. to 1½ft. thick, little annulate, but reaching a height of 60ft. to 80ft. Venezuela, Trinidad, 1860. Stove. SYN. *Trithrinax mauritiæformis.*

S. Palmetto (Palmetto).* Cabbage Palmetto; Palmetto Palm. *fl.*, petals slightly united at the base; style thick; spadix smooth and spreading, commonly shorter than the leaves. June. *fr.* black, four to five lines in diameter. *l.* 5ft. to 8ft. long, cordate in outline, flabellately-pinnatifid, recurved at the summit, the base long-persistent; divisions very numerous, deeply cleft, and with thread-like filaments at the sinuses; petioles smooth, concave, mostly longer than the leaves. Trunk erect, 20ft. to 40ft. high, simple, leafy at the summit. Southern United States, 1825. Greenhouse. SYN. *Chamærops Palmetto.*

S. serrulata (serrulated). A synonym of *Serenoa serrulata.*

S. umbraculifera (umbrella-bearing).* *fl.* whitish; petals equalling the stamens; spadix 4ft. to 5ft. long, with paniculate branches. *fr.* greenish-black, four to five lines in diameter. *l.* 4in. to 6in. in diameter, sub-orbicular, glaucescent, multifid to one-third to two-thirds, with loose fibres between the bifid lobes; petioles 6ft. to 8ft. long. Trunk at length 60ft. to 80ft. high. West Indies, 1825. Greenhouse.

S. umbraculifera (umbrella-bearing), of Martius. A synonym of *S. Blackburniana.*

SABBATIA (dedicated to L. Sabbati, an Italian botanist, who published a "Synopsis Plantarum," in 1745). American Centaury. ORD. *Gentianeæ.* A genus comprising thirteen species of hardy, annual or biennial, erect herbs, simple or paniculate above; they are natives of North America and Cuba. Flowers white or rose-purple, handsome; calyx five to ten-parted or cleft; corolla with a very short tube, rotate, with five to twelve ovate or narrow, twisted lobes; stamens five to twelve; anthers soon recurved or revolute. Leaves opposite, sessile or stem-clasping. Sabbatias are very elegant plants when in blossom; those described below are well worth cultivating in every collection. Seeds, as soon as ripe, should be sown thinly in pots, or on a shady border, in peaty soil; if the former plan is adopted, the pots should be placed in shallow pans of water, as the plants grow naturally in bogs and marshy places. All the species here given are North American, and flower in summer.

S. angularis (angular). Rose Pink. *fl.* on short peduncles; corolla rose-pink, rarely white, 1½in. wide, with a yellowish or greenish eye; calyx lobes ¼in. to ⅜in. long. *l.* ovate, somewhat acute, with a slightly cordate, clasping base. Stem erect, 1ft. to 2ft. high, pyramidally many-flowered. 1826.

S. calycosa (large-calyxed).* *fl.*, calyx lobes leafy, ⅜in. to 1in. long, exceeding the almost white corolla; peduncles elongated, one-flowered. *l.* oblong or lanceolate-oblong, narrowed at base. Stem 5in. to 20in. high, diffusely forking. 1812. (B. M. 1600.)

S. campestris (field-loving).* *fl.*, corolla rose-colour, five-parted, equalled by the lanceolate calyx segments. *l.* ovate, the lower ones obtuse. Stem tetragonal, dichotomously branched; branchlets one-flowered. *h.* 1ft. 1855. (B. M. 5015; R. G. iii. 73.)

S. chloroides (Chlora-like). *fl.*, calyx lobes linear; corolla deep rose-coloured, rarely white, nine to twelve-parted, twice as long

Sabbatia—*continued.*

as the calyx. *l.* oblong-lanceolate. Stem loosely panicled above, 1ft. to 2ft. high. 1817.

S. paniculata (panicled). *fl.* disposed in many-flowered, corymbose cymes; calyx lobes linear, thread-like, much shorter than the white corolla. *l.* linear, or the lower ones oblong, obtuse. Stem brachiately much-branched. *h.* 1ft. to 2ft. 1817.

S. stellaris (star-like). *fl.*, calyx lobes awl-shaped, varying from half to nearly the length of the bright rose-purple corolla; peduncles elongated, one-flowered. *l.* oblong- or ovate-lanceolate, or the upper ones linear. Stem 6in. to 20in. high, loosely branched and forked. 1827.

FIG. 400. SACCHARUM ÆGYPTIACUM (see page 340).

SABBATIA (of Moench). A synonym of **Micromeria** (which *see*).

SABIACEÆ. A small but well-defined natural order of glabrous or pilose trees or shrubs, inhabiting tropical and sub-tropical regions, mostly of the Northern hemisphere. Flowers hermaphrodite or polygamo-diœcious, small or minute, rarely rather large, variably disposed, usually panicled; calyx four or five-parted, imbricated; petals four or five, equal or unequal, alternate with or opposite the sepals, imbricated; disk small, annular, lobed, rarely tumid; stamens four or five, inserted at

Sabiaceæ—*continued.*

the base or on the top of the disk opposite the petals, usually two perfect and three antherless. Fruit consisting of one or two dry or drupaceous, indehiscent carpels; endocarp crustaceous or bony, one-seeded. Leaves alternate, exstipulate, simple or pinnate, entire or serrated, penninerved. The wood of the Indian *Meliosma* is of excellent quality, and is in great demand for house-building. *Sabiaceæ* comprises four genera—*Meliosma*, *Ophiocaryon*, *Phoxanthus*, and *Sabia*—and about thirty-two species.

SABICEA (*Sabisabi* is the name of *S. aspera* in Guiana). SYNS. *Schwenkfelda*, *Schwenkfeldia*. ORD. *Rubiaceæ*. A genus comprising about twenty-eight species of stove, twining shrubs, often tomentose, villous, or pilose; they are all tropical, and inhabit America, Africa, and Madagascar. Flowers clustered in axillary, sessile or pedunculate, corymbose cymes or heads; calyx tube sub-globose, the limb long, three to six-lobed; corolla funnel-shaped or hypocrateriform, the limb of four or five short, valvate lobes; stamens five. Leaves opposite, oblong; stipules intrapetiolar, usually persistent, erect or recurved. Only two of the species have been introduced to cultivation. They require to be grown in a compost of peat, loam, and sand. Propagated by cuttings, inserted in sand, under a hand glass, in heat.

S. aspera (rough). *fl.* white, fascicled, sub-verticillate, sessile. June. *l.* elliptic, acuminate, rough above, villous beneath; stipules oval-oblong, acute. *h.* 6ft. Guiana, 1824.

S. hirta (hairy). *fl.* white; involucre of four leaflets; umbels three-flowered, shortly pedunculate. June. *l.* ovate-lanceolate, acuminate, hairy on both sides; stipules large, cordate-ovate, membranous. *h.* 6ft. Jamaica, 1825.

SABINEA (named in honour of Joseph Sabine, F.R.S., F.L.S., &c., some time Secretary of the Horticultural Society of London). ORD. *Leguminosæ*. A small genus (two or three species) of stove trees or shrubs, natives of the West Indies. Flowers pink, fascicled; calyx very shortly toothed; standard sub-orbicular, spreading or reflexed; wings falcate-oblong, free; keel incurved; bracts small; bracteoles absent. Pods linear, flat-compressed, two-valved. Leaves abruptly pinnate; leaflets deciduous, entire, exstipellate. These plants will thrive in a well-drained sandy loam. Propagation may be effected by young cuttings, inserted in a pot of sand, under a hand glass, in heat.

S. carinalis (conspicuous-keeled). *fl.* bright scarlet, three to five in a fascicle, precocious; wings and standard, 1in. long; keel sixteen to eighteen lines long. *l.*, leaflets six to eight-jugal, distant, obtuse-mucronulate, oblong, five to six lines long.

S. florida (flowery). *fl.* rosy; wings and standard ½in. long; keel ⅝in. long, semi-orbicular. *l.*, leaflets eight to fifteen-jugal, oblong or elliptic-oblong, ¼in. long.

SACCATE, SACCIFORM. Sac-shaped; in the form of a bag.

SACCHARUM (*saccharon* is the old Greek name for sugar; it is derived from the Sanscrit *carkara*). ORD. *Gramineæ*. A genus comprising about a dozen species of tall, mostly stove grasses, inhabiting tropical

Saccharum—*continued.*

and sub-tropical regions. Spikelets at the sides of the branchlets, dense, or ample and twin, one sessile, the other pedicellate; glumes four, three of which are empty, acute or somewhat bristly-acuminate; panicle terminal, densely pilose, sometimes ample and densely bundle-flowered, sometimes contracted into a dense spike. Leaves flat or narrow, convolute when dry. The most important species is *S. officinarum*, the Sugar Cane of commerce, one of our most valuable economic productions. It has been cultivated from time immemorial. The manufacture of sugar is supposed to have been derived from China. Some of the species are ornamental plants; a selection of the best-known is given below. They are all of simple culture in a light, rich soil, with a good heat. Propagation may be effected by suckers; or by cuttings of the stems, which will throw out shoots at their joints. The under-mentioned species require stove treatment, except where otherwise stated.

S. ægyptiacum (Egyptian).* *fl.*, panicle silvery-silky, crowded; 10in. to 12in. long; lower branches compound. July. *l.* numerous, long, ribbon-like, with a white midrib, and covered with soft, silky hairs, which impart a greyish appearance to the plants. Stems about 7ft. high. Algeria, 1866. A vigorous grass, forming a gigantic tuft, and rivalling *Bambusa*, *Erianthus*, and *Gynerium*. See Fig. 400 (page 339).

S. Munja (Munja). *fl.* all hermaphrodite; panicle large, oblong, spreading, the branches whorled, supra-decompound. Summer. *l.* hispid, marginate, long-linear, white-nerved, channelled. Stems 8ft. to 10ft. high. Benares, 1805. Plant wholly glabrous, except on the inside of the leaves at base.

S. officinarum (officinal). Sugar Cane. *fl.*, palea half as long as the third glume; outer glumes pointed, half to one-third as long as the wool; panicle large, pyramidal, the common axis sulcate, the joints and pedicels glabrous below the wool. July. *l.* long and broad, dark green, hanging in graceful curves. Stems yellowish-green, stout, erect. *h.* 10ft. East Indies, 1597.

S. o. violaceum (violet). *fl.*, midrib of the second glume suppressed. Stems of a rich violet or plum-colour. West Indies, 1824.

S. procerum (tall). *fl.*, panicle diffuse, the branches whorled, compound and decompound. July. *l.* ensiform, the midrib white, the margins slightly hispid. Stems erect, 10ft. to 20ft. high. Bengal, 1822. This is allied to *S. officinarum*.

S. sinense (Chinese). *fl.* bivalved, unilateral; panicle ovate, the branches whorled, simple and compound. Stems 6ft. to 10ft. high. China, 1822. Greenhouse.

SACCOCHILUS. A synonym of **Saccolabium** (which *see*).

SACCOLABIUM (from *saccus*, a bag, and *labium*, a lip; alluding to the baggy lip). SYNS. *Robiquetia* and *Saccochilus*. Including *Œceoclades* (in part). ORD. *Orchideæ*. This genus embraces about thirty species of very fine, stove, epiphytal orchids, natives of the East Indies and the Malayan Archipelago. Flowers racemose or scattered, shortly pedicellate; sepals subequal, free, spreading or erecto-patent, flat or concave; petals nearly similar, sometimes broader, rarely narrower; lip sessile at the base of the column, spurred or saccate at base, the lateral lobes erect, often small, the middle one spreading or erect, polymorphous; column short; pollen masses two; peduncles lateral, simple or branched. Leaves distichous, spreading, coriaceous, fleshy, or slender, flat or rarely terete. Stems leafy, not pseudo-bulbous. "In their habit of growth, the species of *Saccolabium* are similar to those of *Aërides*, and they require the same degree of heat, and the same general treatment, except that they are best grown in baskets suspended near the roof, so that they may receive all the light possible, and not too much shade—only enough to preserve their foliage from being scorched. The more light they receive, the more vigorous and better matured will be their growth, and this will lead to the production of fine floral racemes. They will also thrive in pots, placed near the glass, and on blocks; but, grown on this latter plan, they require more water. They are propagated in the same way as the Aërides, and are liable to become infested by the same sorts of insects" (B. S. Williams). The best-known species are here described. Some of them should find a place in every collection, as they are very handsome plants, even when not flowering.

Saccolabium—*continued.*

S. acutifolium (acute-leaved).* *fl.* about ¾in. in diameter, in small corymbs, on stiff peduncles 2in. to 3in. long; sepals and petals yellow, obovate, acute; lip pale pink, concave at base, where it has a rounded lobe on each side. *l.* 6in. long, sessile, slightly amplexicaul, oblong-lanceolate, very acute, flat, apparently fleshy. Stems 6in. high. Khasya, 1837. (B. M. 4772 and P. M. B. vii. 145, under name of *S. denticulatum*.)

S. ampullaceum (flask-formed). A synonym of *S. rubrum*.

S. bellinum (pretty). *fl.* borne in a compact corymb, on a decurved peduncle; sepals and petals straw-colour, blotched with dark brown; lip white, spotted with mauve-purple, fleshy, having on each side a large cushion of filiform processes, yellow and spotted with red in the centre. February and March. *l.* lorate, obliquely bifid. Stems erect, short. Burmah, 1884. (W. O. A. 156.)

S. Berkeleyi (Berkeley's).* *fl.* large, disposed in a loose raceme; sepals and petals white, spotted and striped with amethyst; lip acute, not bilobed, the anterior blade amethyst. *l.* præmorse. Probably Andaman Islands. A beautiful species.

S. bigibbum (bigibbous).* *fl.* about eight in a drooping, subcorymbose, shortly-pedunculate raceme; sepals and petals pale yellow, spathulate; lip remarkable, white, triangular, with a very broad, blunt spur, the edges frilled, the centre yellow. November. *l.* persistent, linear-oblong, bifid, bright green, about 4in. long. Stems very short. Rangoon, 1868. A rather rare, close-growing species. (B. M. 5767.)

S. Blumei (Blume's). A synonym of *Rhynchostylis retusa*.

S. borneense (Bornean).* *fl.* of a peculiar ochre-cinnamon colour, something like those of a Sarcanthus, produced in a nodding, dense raceme; sepals and petals oblong, acute, connivent; spur of the lip clavate and depressed, with an abrupt, broad top; side laciniæ rounded and toothleted, the middle one almost terete, with an apiculus. *l.* broad, short, unequally bilobed, very fine. Borneo, 1881.

S. buccosum (inflated). *fl.* yellowish, with a few dark purplish-brown dots on the side laciniæ of the lip and on the spur, erect, small; sepals oblong, acute; petals ovate, shorter than the sepals; blade of the lip trifid, the lateral segments ovate, acute, the middle one lanceolate, acute, carinate; raceme few-flowered, rather dense. *l.* ligulate, obliquely and obtusely bilobed at apex. Moulmein, 1871.

S. calopterum (beautiful-winged).* *fl.* rich purple, white at the base of the sepals and petals, rather large, much like those of *Vanda cærulescens*; petals spathulate, acute; lateral laciniæ of lip elongated, with a free, acute apex; middle one triangular, acute, much smaller; panicle flexuous. New Guinea, 1882.

S. cœleste (celestial).* *fl.*, sepals and petals tipped with sky-blue, blunt, cuneate-oblong; anterior part of the lip blue, the compressed, recurved spur also having a blue tint on both sides of its centre; two falcate, subulate bodies rise from the apex inside the spur; inflorescence short and dense, 3in. to 4in. long. Probably Moulmein. Habit similar to that of *S. curvifolium*.

S. curvifolium (curved-leaved).* *fl.* cinnabar-red, small, crowded in erect, axillary racemes, freely produced. May and June. *l.* linear, acutely præmorse, deflexed, channelled, light green. Stem erect, 6in. to 12in. high. East Indies. A handsome, compact species, thriving well on a block suspended from the roof. (I. H. 493; W. O. A. 107; B. M. 5326, under name of *S. miniatum*.)

S. c. luteum (yellow). *fl.* clear yellow. Moulmein. A rare variety.

S. dives (rich). *fl.* whitish-yellow, small, very numerous. *l.* stout, straight, linear-ligulate, unequally bilobed at the apex, 7in. long, about ¾in. wide. India (Bombay district), 1875. A very curious plant.

S. flexum (bent). *fl.* red; sepals and petals ligulate, obtuse or acute; lip trifid, the lateral laciniæ obtuse-angled, minute, the middle one triangular with a thickened limb; racemes small, porrect. New Guinea, 1882.

S. fragrans (fragrant). *fl.* white, numerous, violet-scented, in rich racemes; tops of the sepals and petals, and the whole of the pandurate lip, fine mauve-purple; spur curved, blunt. *l.* few, oblong, acute, full of rugosities and depressions, reticulated, dark green, with some dirty purple underneath. Burmah, 1882.

S. furcatum (forked). *fl.* white, spotted with rose-colour, more loosely disposed than in *Rhynchostylis retusa*. July and August. *l.* stout, about 8in. long. India, Java. A distinct and somewhat slow-growing species.

S. giganteum (gigantic).* *fl.* very sweetly perfumed, freely produced, in long, dense, drooping racemes; sepals and petals white, spotted with amethyst; lip of a beautiful mauve-violet, cuneate, dilated. Winter. *l.* broadly lorate, 1ft. long, 3in. wide, obliquely bilobed, stout, streaked. Stem short, erect. Burmah, 1864. (B. M. 5635; W. O. A. 56.) SYN. *Vanda densiflora* (F. d. S. 1765-6).

S. g. illustre (illustrious). *fl.* richer-coloured, larger, and more loosely disposed, than in the type; lip of a brighter hue; raceme

Saccolabium—*continued.*

longer. *l.* longer and broader, more prominently veined. Cochin China. A handsome variety. (I. H. ser. iii. 517.)

S. Græffei (Dr. Graeffe's). *fl.* deep purple, pendent, conspicuous; blade of the lip short, three-toothed, having a transverse lamella in front of the base of the middle lacinia; spur cylindrical, blunt, constricted; spike borne on a strong peduncle. *l.* broad, ligulate, retuse, bilobed. Viti Islands, 1881.

S. gurwalicum (Gurwal). *fl.* white, with the exception of the amethyst lip, and some similarly-coloured blotches on the sepals and petals; spur hairy inside. India, 1879. A pretty plant, resembling *Rhynchostylis retusa* in habit, but only about half the size of that species. The proper name of this plant is *Rhynchostylis gurwalicum.*

S. guttatum (striped). A synonym of *Rhynchostylis retusa.*

S. Harrisonianum (Harrison's). A variety of *S. violaceum.*

S. Hendersonianum (Henderson's). *fl.* numerous, in erect, axillary racemes; sepals and petals of a beautiful rose-colour; lip white, compressed, reduced to little besides the spur. *l.* about 6in. long, ligulate, keeled, of a lively green. Borneo, 1862. A small, compact-growing species. (B. M. 6222.)

S. Huttoni (Hutton's). *fl.* borne in a rather open raceme, 1ft. long; sepals and petals of a beautiful rose-colour; lip bright amethyst. *l.* coriaceous, distichous, loriform, keeled, unequally bilobed at the apex. Stem short. Java, 1867. (B. M. 5681.) SYN. *Aërides Huttoni.*

S. mimus (mimic). *fl.* rose-purplish, tipped with green; sepals and petals ligulate, acute; lip having semi-ovate, erect side laciniæ, a triangular middle segment, and a cylindrical, slender spur, with a bent, dilated apex, equalling the pedicellate ovary; racemes one-sided. *l.* oblong-ligulate, with two blunt, unequal lobes, 5in. long, nearly 2in. broad. South Sea Islands, 1878.

S. miniatum (scarlet). *fl.* of a brilliant orange-red, small, disposed in short, spreading, cylindrical racemes. March and April. *l.* lorate, channelled, obliquely truncate at apex. Stems short, erect. Java, 1846. A pretty and distinct, but not very showy orchid. (B. R. 1847, 58.)

S. m. citrinum (citron-coloured). *fl.* lemon-yellow, with a dark centre; inflorescence rich, dense. Philippine Islands, 1884.

S. papillosum (papillose). *fl.* white, painted with yellow and purple; sepals fleshy, linear-ovate, obtuse; lip papillose, with an obconical, obtuse spur; racemes small, one-third the length of the leaves, capitate. May and June. *l.* ligulate, 4in. to 6in. long, præmorse at apex, dark green. Stem arcuate, nearly 1ft. long. Malabar, 1840. (B. R. 1552.) SYN. *S. præmorsum* (F. d. S. vii. p. 92; G. M. B. i. p. 253).

S. præmorsum (bitten). A synonym of *S. papillosum.*

S. pumilio (dwarf). *fl.* small, in a bent, cylindrical, dense raceme, shorter than the leaves; sepals and petals yellowish, ligulate, obtuse; lip white, with some purplish marks on the blade. *l.* scarcely more than 3in. long, nearly 1in. wide, oblong, unequally bilobed at apex, dark green above, purple beneath. Manilla, 1875.

S. retusum (retuse). *fl.* of a waxy-white, spotted with pink, produced in great abundance in long racemes. May and June. Java. "A fine, handsome, free-growing form, and probably one of the many varieties of *Rhynchostylis retusa* indicated by Reichenbach when treating of this species. It is more robust in habit than most other forms" (B. S. Williams). (F. d. S. 1463-4.)

S. rubrum (red).* *fl.* of a beautiful deep rose-colour, in dense, erect, axillary, oblong racemes about 6in. long; sepals and petals ovate; lip linear, with a long, slender, compressed spur. May and June. *l.* dark green, thick, ligulate, channelled, 3in. to 4in. long, truncate and toothed at apex. Stem simple, erect, 8in. to 10in. high. India, 1839. A distinct species, succeeding on a block or in a basket. SYN. *S. ampullaceum* (B. M. 5595; L. S. O. 17; P. M. B. xiii. 49; W. O. A. 191).

S. r. moulmeinense (Moulmein). *fl.* of a uniform, rich, deep rose, larger than in the type, spike longer and denser. *l.* spotted with dull brown. A superb, robust variety. (F. M. 393, under name of *S. ampullaceum roseum.*)

S. speciosum (showy). This is the correct name of the plant described in this work as *Aërides maculosum.*

S. Turneri (Turner's).* *fl.* lilac-spotted, very beautiful, densely produced in racemes fully 2ft. long. June. *l.* about 1ft. long and 1½in. broad, distinctly præmorse at the apex. India, 1878.

S. violaceum (violet).* *fl.* very numerous, borne in showy, axillary racemes 1ft. to 1½ft. long; sepals and petals pure white, spotted with mauve; lip of a dark mauve, marked with deeper-coloured lines. January and February. *l.* 1ft. or more long, 2in. broad, recurved, deep green, somewhat striated with lines of a deeper colour. Stems stout, erect. Manilla, 1839. SYN. *Vanda violacea* (B. R. 1847, 30).

S. v. Harrisonianum (Harrison's).* *fl.* pure white, large, very sweet-scented, borne in dense, axillary racemes sometimes 2ft. long. Winter. *l.* broadly oblong, keeled beneath, striated, unequally bilobed at apex, of a rather lighter green than those of the type. Pulo Copang, 1864. (B. M. 5433, F. d. S. 2412, and W. O. A. 235, under name of *S. Harrisonianum.*)

Saccolabium—*continued.*

S. Witteanum (Witte's). *fl.* in a loose, elongated raceme; sepals and petals orange, with reddish spots; lip white, with some purple markings, and a green apex to the spur, the mouth of which is covered by three teeth. *l.* cuneate-oblong, toothed at apex, 2ft. or more long. Java, 1884. In general appearance, this plant resembles *Sarcanthus densiflorus.*

SACCOLOMA. Included under *Davallia.*

SACCUS. A bag or cup. The term is occasionally applied to the crown of *Stapelia*, &c.

SACRED BEAN OF THE EGYPTIANS. In books, the plant called by this name is generally said to be *Nelumbium speciosum*, but recent researches have proved it to be *Nymphæa Lotus.*

SADDLE GRAFTING. *See* **Grafting.**

SADDLE-SHAPED. Oblong, with the sides hanging down, after the manner of the laps of a saddle.

SADDLE-TREE. A common name for *Liriodendron tulipiferum.*

SADLERIA (named after Joseph Sadler, Professor of Botany at Pesth). ORD. *Filices.* A genus comprising only a couple of species of arborescent, stove ferns, natives of the Sandwich Islands and Sumatra. Sori in a continuous line, close to the midrib on both sides, placed on an elevated receptacle; involucre narrow, sub-coriaceous, at first wrapped over the sorus, afterwards spreading. Only one of the species has been introduced to our gardens. It is a fine plant, combining the habit of a small Cyathea with the fructification of a Blechnum. For general culture, *see* **Ferns.**

S. cyatheoides (Cyathea-like). *cau.* 3ft. to 4ft. high. *sti.* strong, erect, 6in. to 18in. long, naked except at the base, and there clothed with long-linear scales. *fronds* 4ft. to 6ft. long, 9in. to 18in. broad; pinnæ 8in. to 12in. long, ¼in. to ⅜in. broad, cut down to the rachis into very numerous, connected, linear pinnules, ⅛in. to ¼in. long, acute or bluntish. Sandwich Islands, 1877. (G. C. n. s., vii. p. 761.)

SAD-TREE. *See* **Nyctanthes arbor-tristris.**

SAFFLOWER. *See* **Carthamus.**

SAFFRON, MEADOW. *See* **Colchicum.**

SAFFRON-PLANT. A common name for *Crocus sativus.*

SAFFRON THISTLE. *See* **Carthamus tinctorius.**

SAGE (*Salvia officinalis*). An evergreen undershrub, native of Southern Europe, and sufficiently hardy to withstand any ordinary winter outside. The uses of Sage for stuffing, &c., are well known. The plants succeed best in a warm and rather dry border, but they grow well almost anywhere in ordinary garden soil. Propagated occasionally by seeds, but more generally from cuttings, or rooted slips, which may often be procured in quantity. Cuttings for propagating should be taken early in summer from the growing points, and inserted, under a hand glass, in a shady border outside. A space of not less than 1ft. apart should be allowed when planting out permanently afterwards.

SAGE BUSH. A name applied to various species of *Artemisia.*

SAGE, JERUSALEM. *See* **Phlomis fruticosa.**

SAGENIA. Included under **Nephrodium** (which *see*).

SAGE OF BETHLEHEM. *See* **Pulmonaria officinalis.**

SAGERETIA (named after M. Sageret, a distinguished French agriculturist). ORD. *Rhamneæ.* A genus comprising about half-a-score species of stove or greenhouse shrubs, with slender or rigid, unarmed or spiny branches, natives of Central and Southern Asia, Java, and the warmer parts of North America. Flowers small,

Sageretia—*continued.*

five-parted. Leaves sub-opposite, shortly petiolate, oblong or ovate, pinnately nerved and reticulated, entire or serrated; stipules minute, deciduous. *S. hamosa*, perhaps the only species introduced, is probably lost to cultivation in this country.

SAGE ROSE. An old name for the genus *Cistus*. *See also* **Turnera ulmifolia.**

SAGINA (from *sagina*, fatness; alluding to the presumed nourishing qualities of the plants for sheep). Pearl Weed; Pearlwort. ORD. *Caryophylleæ*. A genus comprising about eight species of small, tufted, annual or perennial herbs (mostly weeds), natives of the temperate and frigid regions of the Northern hemisphere, one being also broadly dispersed over the Southern hemisphere. Flowers small, usually long-pedicellate; sepals four or five; petals four or five, entire or loosely emarginate, sometimes minute or wanting. Leaves subulate. *S. pilifera* is a hardy evergreen, suitable, in some situations, as a substitute for grass edging. "To raise from seed, sow in May. To establish an edging from plants, plant patches in September, about 2in. apart. They require to be frequently beaten flat with the back of the spade. It seems too apt to become patchy to be relied on for any extensive surface, like a lawn" (N. E. Brown).

S. pilifera (hair-bearing). *fl.* white; petals twice as large as the calyx; peduncles very long. July and August. *l.* opposite, linear, awned, rather stiff, glabrous, in bundles. Stems creeping, branched, tufted. *h.* 2in. Corsica, 1826.

S. p. aurea (golden). This only differs from the type in its golden-yellow foliage. It is a good plant for carpet bedding.

SAGITTARIA (from *sagitta*, an arrow; alluding to the prevalent form of the leaves). Arrow-head. ORD. *Alismaceæ*. A genus consisting of about fifteen species of stove, greenhouse, or hardy, marsh-loving, usually erect, perennial herbs, inhabiting temperate and tropical regions. Flowers white, usually ternately whorled, spicate or panicled, pedicellate, three-bracted (in one species one-bracted) at the nodes; perianth segments six, in two series, the outer ones persistent, the inner ones larger, petaloid, deciduous; stamens nine or more, usually numerous; scape erect, slender or robust. Leaves on long or often thick petioles, elliptic-lanceolate or sagittate, often pellucid-dotted or lineolate. The under-mentioned species are hardy, except where otherwise stated. They require a loamy soil, and may be readily increased by division. All flower in summer.

S. acutifolia (acute-leaved). A synonym of *S. graminea*.

S. graminea (grass-like). *fl.*, lower whorls fertile; bracts usually connate; pedicels slender; scape very slender, erect, 1ft. to 2ft. high. *l.* varying from ovate-lanceolate to linear, or reduced to broad and acute phyllodes, scarcely ever sagittate. North America, 1812. SYN. *S. acutifolia*.

S. heterophylla (variable-leaved).* *fl.* of the lowest whorl fertile and almost sessile, the sterile ones on long pedicels; bracts obtuse; scape weak, 2ft. to 3ft. high, at length procumbent. *l.* lanceolate or lanceolate-oval, entire or with one or two narrow, basal, sagittate, appendages. North America, 1822.

S. h. rigida (rigid). *l.* rigid, narrowly lanceolate, acute at both ends; petioles stout. A tall form. (B. M. 1632, under name of *S. rigida*.)

S. lancifolia (lance-leaved). *fl.* on slender pedicels; several of the lower whorls fertile; bracts acute or acuminate; scape 2ft. to 5ft. high. *l.* lanceolate or lanceolate-oblong, rarely linear, all with a tapering base, 6in. to 18in. long, on long, stout petioles, never sagittate. North America and West Indies, 1787. Greenhouse. (A. B. R. 333; B. M. 1792.)

S. l. angustifolia (narrow-leaved). A variety having the blades of the leaves very narrow or all deficient. Plant much smaller, in all its parts, than the type. (B. R. 1141, under name of *S. angustifolia*.)

S. montevidensis (Monte Video).* *fl.* white, with a crimson spot at the base of each petal, large, in lax whorls, borne on a tall scape; scapes bearing the female flowers much stouter, and the pedicels shorter, than those of the males. *l.* sagittate. South America, 1834. An exceedingly handsome, free-flowering, stove or greenhouse aquatic. (B. M. 6755; Gn. xxvii. p. 8; I. H. 1884, p. 189.)

Sagittaria—*continued.*

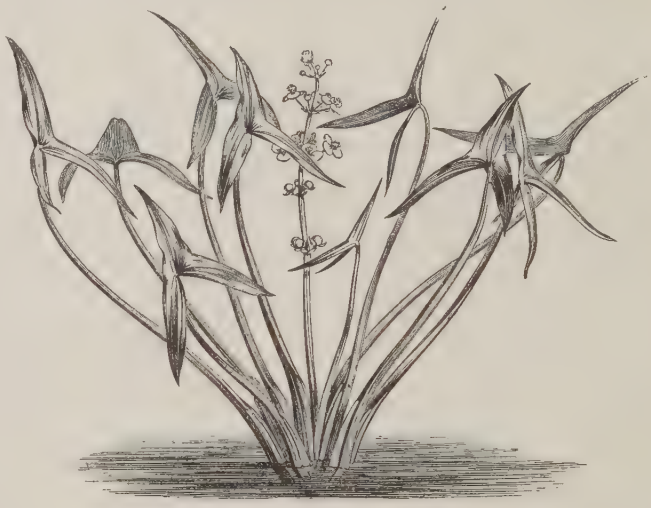


FIG. 401. SAGITTARIA SAGITTIFOLIA.

S. sagittifolia (Arrow-leaved).* Common Arrow-head. *fl.* ½in. in diameter, males large; petals with purple claws; whorls three to five, distant, three to five-flowered; scape 6in. to 18in. high. *l.*, blade hastate, obtuse or acute, 2in. to 8in. long, erect, the lobes long, more or less diverging, acuminate, the first developed submerged; petioles stout, 8in. to 18in. long. Stems swollen at base, stoloniferous. Europe (Britain), &c. See Fig. 401. (Sy. En. B. 1436.) *S. diversifolia* is a variable-leaved form. (B. M. 1631, under name of *S. sinensis*.)

S. variabilis (variable). *fl.*, one or more of the lower whorls fertile; petals with white claws; filaments about twice the length of the anthers; pedicels of the fertile flowers about half the length of those of the sterile ones; scape 3in. to 4ft. high. angled. *l.* very variable, almost always sagittate. North America, 1818.

S. v. flore-pleno (double-flowered). A form with double flowers.

S. v. hastata (halberd-shaped). *l.* narrow, halberd-shaped or sagittate.

S. v. latifolia (broad-leaved). *l.* broad, acute, sagittate.

S. v. obtusa (obtuse). *l.* broadly sagittate, obtuse, 6in. to 12in. long.

FIG. 402. SAGITTATE LEAF.

SAGITTATE, SAGITTIFORM. Resembling an arrow-head in shape. A Sagittate leaf is shown at Fig. 402.

SAGONEA. A synonym of **Hydrolea** (which *see*).

SAGRÆA (named in honour of Ramon de la Sagra, Director of the Botanical Gardens in Havannah, of which he wrote an account in 1827). SYN. *Staphidiastrum*. ORD. *Melastomaceæ*. A genus comprising about twenty-seven species of stove, villous, bristly, or tomentose, rarely glabrous shrubs, closely allied to *Clidemia*, natives of equatorial America. Flowers small or minute, disposed in small or large, axillary, solitary or fascicled panicles; calyx four-lobed; petals four, obtuse or retuse; stamens eight. Berries four-celled, often hairy. Leaves sessile or petiolate, ovate, oblong, or cordate, three to seven-nerved, entire or denticulated. A selec-

Sagræa—*continued.*

tion from the introduced species is here presented. For culture, *see* **Melastoma.**

S. hirsuta (hairy). *fl.* white; petals ovate, acute; peduncles axillary, trifid. May. *fr.* dark purple, hairy. *l.* oblong-lanceolate, acuminate, denticulated, densely hairy on the nerves beneath; petioles (as well as the peduncles and calyces) bristly, slightly purplish, hirsute. *h.* 6ft. 1823.

S. sessiliflora (sessile-flowered). *fl.* red; crowded in the axils, sub-sessile; petals oval, obtuse. April. *l.* sub-sessile, oval, acuminate, crenulated, seven-nerved, ciliated, densely bristly-pilose above, villous-hairy beneath. Branches terete, densely-rufous-hairy. *h.* 4ft. 1793.

S. umbrosa (shade-loving). *fl.* red; petals obovate; panicles axillary, loosely trichotomous, slightly hispid, as long as the petioles. March. *l.* broadly ovate, acuminate, serrulated, ciliated, densely pilose on the nerves; petioles 1½in. long. *h.* 6ft. 1824.

SAGRÆA (of Naudin). A synonym of **Ossæa** (which *see*).

SAGUERUS. A synonym of *Arenga.*

SAGUS (in part). A synonym of **Metroxylon** (which *see*).

ST. ANDREW'S CROSS. *See* **Ascyrum Crux-Andreæ.**

ST. BARBARA'S HERB. A common name for *Barbarea vulgaris.*

ST. DABEOC'S HEATH. *See* **Dabœcia polifolia.**

SAINTFOIN. *See* **Onobrychis sativa.**

ST. GEORGE'S HERB. *See* **Valeriana officinalis.**

ST. JOHN'S BREAD. A common name for *Ceratonia Siliqua.*

ST. JOHN'S WORT. *See* **Hypericum perforatum** and **Symphoricarpus vulgaris.**

ST. JOSEPH'S LILY. *See* **Lilium candidum.**

ST. MARTIN'S FLOWER. A common name for *Alstrœmeria pulchra.*

ST. MARTIN'S HERB. *See* **Sauvagesia erecta.**

ST. MARY'S WOOD. A common name for *Calophyllum inophyllum.*

ST. PATRICK'S CABBAGE. *See* **Saxifraga umbrasa.**

ST. PETER'S WORT. A name applied to *Ascyrum stans, Hypericum Ascyron, Primula officinalis,* and the genus *Symphoricarpus.*

SALACCA. *See* **Zalacca.**

SALACIA (a mythological name after Salacia, wife of Neptune). Including *Anthodon, Johnia, Tonsella,* and *Tontelea.* ORD. *Celastrineæ.* A large genus (sixty to seventy species) of climbing or sarmentose, stove shrubs or small trees, inhabiting the tropical and sub-tropical regions of Asia, Africa, and America. Flowers usually axillary, on short branchlets, fascicled or cymose, rarely solitary or binate, sometimes paniculate; calyx small, five-parted; petals five, spreading, imbricated; stamens three, very rarely two or four. Fruit a one to three-celled berry, occasionally large, edible. Leaves generally opposite, petiolate, coriaceous, shining above, entire or crenate-serrate, exstipulate. The majority of the species are of no great beauty, and are only worth growing in botanical collections. Those usually seen in gardens are described below. They thrive in sandy loam, and may be propagated by ripened cuttings, inserted in sand, under a glass, in heat.

S. prinoides (Prinos-like). *fl.* greenish-yellow, small; peduncles axillary, one-flowered. June. *fr.* one-seeded, about the size and shape of a small cherry. *l.* serrate. East Indies, 1820. Climber. SYN. *Johnia coromandeliana.*

S. pyriformis (Pear-shaped). *fl.* greenish-yellow, small; peduncles axillary, one-flowered, aggregate. June. *fr.* about the size of a Bergamot Pear, with a very sweet taste. *l.* oblong, slightly toothed. *h.* 5ft. Upper Guinea, 1825. Shrub.

S. Roxburghii (Roxburgh's). *fl.* orange-coloured, small; peduncles axillary, one-flowered. June. *fr.* dull red, two or three-seeded, with white pulp. *l.* broad-lanceolate, entire. *h.* 4ft. Chittagong, 1822. A small tree. SYN. *Johnia salacioides.*

SALAD BURNET. *See* **Burnet** and **Poterium Sanguisorba.**

SALADS. Plants for these are in daily request, and it is therefore important to maintain a supply all the year round, so far as circumstances admit. Lettuces stand first as Salad plants; they should always be well blanched when sent to table. Endive is invaluable in autumn and winter. Mustard and Cress may be obtained ready for use in about a week at almost any time of year, if a little heat is at command. Other plants which enter more or less into the composition of Salads are: Beet, Chervil, Chicory, Chives, Radishes, Tarragon, and Tomatoes. Details of the culture of these plants may be found under their several headings.

SALAL OR SALLON-SHRUB. A common name for *Gaultheria Shallon.*

SALDANHA. A synonym of **Hillia** (which *see*).

SALICINEÆ. A natural order of trees or shrubs, chiefly inhabiting Northern temperate and frigid regions, a few being natives of South Africa and South America. Flowers dicœcious, disposed in catkin-like spikes or rarely racemes, each furnished with a membranous, entire or lobed bract; perianth replaced by a glandular or urceolate disk; stamens of the male flowers two or numerous, inserted on the centre of the torus; ovary of the females sessile or shortly stipitate; style short or very short, two or four-fid. Capsule ovoid or oblong, usually acuminate, dehiscing in two to four valves at the base. Leaves alternate, entire, serrulated, toothed, or rarely lobed, penniveined or three-nerved, deciduous; stipules free, scaly and deciduous, or foliaceous and leafy. The only two genera—*Populus* and *Salix*—contribute some ornamental subjects to our gardens. Most of the species possess astringent and bitter principles. Poplar wood, although soft, is valued for its lightness; while that of several species of *Salix,* particularly the Osier (*S. purpurea, S. viminalis,* and *S. vitellina*), is in great demand by basket-manufacturers, coopers, and gardeners. The number of species comprised in *Salicineæ* is estimated, by various authors, at between 150 and 300.

SALICORNIA (from *sal,* salt, and *cornu,* a horn; alluding to the economical products and the horn-like branches of the plants). Glasswort; Marsh Samphire. ORD. *Chenopodiaceæ.* A small genus (about eight species) of greenhouse or hardy, annual or perennial, leafless, sea-shore herbs, broadly dispersed. Flowers in terminal, short or elongated, cylindrical spikes. *S. herbacea* (Crab Grass) and *S. radicans* represent the genus in Britain. "The various species of this genus, as well as others belonging to the same family, and growing abundantly on the coasts in the South of Europe and North of Africa, yield a vast quantity of soda, much employed in making both soap and glass, whence comes the English name Glasswort" (Hooker and Arnott). The ashes of these and allied plants were formerly imported under the name of Barilla; but since the introduction of Le Blanc's process for obtaining soda from common salt, Barilla has not been much used. The species have no horticultural value.

SALIGOT. An old name for **Trapa nutans** (which *see.*)

SALINE MANURES. These are contrasted with farmyard Manures and others that contain abundant organic matter, *i.e.,* remains of animals and of plants. The Saline Manures, consisting of mineral substances, are compounds or "salts" of various metals. They differ widely in composition, some being made up of one mineral substance alone, others being compounds of several, mixed naturally or artificially. The artificial Manures are largely employed on farms, and, to some extent, in gardens, to improve the crops either in quantity or in quality. They differ much in their mode of action:

Saline Manures—*continued.*

some of the substances supply to the plants those minerals that are required by all of them, as shown by the chemical analysis of their ashes; *e.g.*, Potassium Chloride supplies to plants the elements Potassium and Chlorine, both of which, but especially the former, are required by them. Ammonium Sulphate, which is often made use of as a Manure, supplies Nitrogen in a form readily taken up by plants. Other Saline Manures serve as food for the plants not only directly, but even still more efficiently by rendering certain injurious acids and other substances harmless, or by acting on various substances already in the soil, changing them from an insoluble to a soluble condition. Plants are able to absorb the substances thus changed, and to employ them as food. As examples of such Manures, Carbonates of Potash and of Soda, and Gypsum or Sulphate of Lime, may be mentioned.

The views generally entertained in regard to the uses of the various elements in Saline Manures may be summed up as follows:

Potassium is concerned in the formation of starch, as is shown by the absence of the latter from plants from which the element is completely withheld. Such plants soon cease to grow; but growth is resumed on Potassium being again given. Potassium Chloride is the best source of this element for plants, and Potassium Nitrate (saltpetre) is the next best. Potassium Sulphates and Phosphates are less efficacious.

Sodium compounds are abundant in many plants near the seashore; but Sodium does not seem essential; at least, plants from which it is withheld often grow equally well with others to which it is supplied.

Calcium and *Magnesium* are always present, though varying much in amount. The absence of Calcium checks growth after a time; but the exact use of each element is uncertain. Possibly, both benefit plants, "partly in serving as a vehicle for Sulphuric and Phosphoric acids in the absorption of food materials, and partly in fixing the Oxalic Acid, which is poisonous to the plant, and in rendering it harmless" (Sachs).

Iron is required, though only in minute quantity, to permit of chlorophyll becoming green, and doing its work in the nutrition of plants; but most soils contain a sufficient amount of Iron, and even a small excess is apt to be injurious.

The Saline constituents required by plants may be supplied to any soil in which they are deficient, either by adding such Manures as contain them, or by subjecting the soil to such treatment as will convert insoluble into soluble salts. One of the most important Manures is Kainite, a mineral brought from various localities, including Greenland. It occurs in rock masses, and consists of Potassic Sulphate, Magnesic Sulphate, and Magnesic Chloride, thus supplying several important elements. Other valuable Manures are mentioned above.

SALISBURIA. A synonym of **Ginkgo** (which *see.*)

SALISIA (of Regel). A synonym of **Gloxinia** (which *see.*)

SALISIA (of Lindley). Included under *Kunzea.*

SALIX (the old Latin name used by Virgil, &c.; connected with the Greek *Lelike* and English Sallow). Osier; Sallow; Willow. ORD. *Salicineæ.* An extensive genus (about 160 species are enumerated by Anderson) of mostly hardy trees or shrubs, broadly dispersed. Flowers sessile; catkins often dense, erect, in temperate regions often early, sessile, and naked, in warmer and frigid regions coætaneous, leafy-pedunculate; bracts small, entire or rarely toothed. Leaves often narrow or small, entire or serrulated, penniveined; stipules variable. The wood of the Willows "is soft and light, and is applied

Salix—*continued.*

to a great variety of purposes, especially for building fast-sailing sloops of war, and for making cricket-bats. Split into thin strips, it is manufactured into hats. The twigs have, from the earliest antiquity, been employed in basket-work, and in Pliny's time (as they are, indeed, at present, in the Northern countries of Europe) were twisted into ropes. The leaves of several species are, on the Continent, used as fodder for cattle, being collected in summer and stacked for winter consumption. In Sweden and Norway, the bark is kiln-dried in seasons of scarcity, and is mixed with oatmeal" (Lindley and Moore). The species used for basket-making are commonly called Osiers; those best adapted for wicker-work are *S. triandra* and *S. viminalis.* Many species have been introduced into England, but only the most desirable are described in this work. Willows grow most freely when planted near water, but they succeed almost anywhere in heavy soil and damp situations. Propagated freely by cuttings, made by firm wood of almost any reasonable size.

Fungi. The Fungi parasitic on the various species of Willows are rather numerous, though seldom so hurtful as to seriously injure the trees or shrubs. Hence, it is unnecessary to enter upon a long account of them here, and only a few of the more generally-diffused species will be mentioned.

The leaves of most kinds of Willows are very apt, in summer and autumn, to become covered with small, yellow or orange spots, which, under a good microscope, are found to be composed of groups of rounded, yellow or orange cells, loosely massed together, and surrounded by the torn edges of the epiderm or skin of the leaf. These belong to a Fungus formerly known as *Lecythea caprearum,* and as *Uredo mixta.* The cells are only an early condition of a Fungus named *Melampsora salicina.* In the latter stage, the Fungus occurs in spring, on leaves lying on the ground, in the form of black spots, made up of oblong, dark spores wedged as closely together as they can lie side by side.

Another very common Fungus on Willows assumes the form of a black crust on the leaves and branches. In its young state, it resembles a dark mould, and has been named *Fumago vagans*; but, when mature, it shows elongated perithecia with asci, in which lie six brown, multicellular spores. This mature condition is not frequent.

A third Fungus that attacks Willows belongs to the same group (*Perisporiacei*) as the last, but differs in colour, covering the leaves with a whitish coat (*see* **Mildew** and **Oidium**). This parasite bears the name of *Uncinula adunca.* The whitish coat is formed by the *Oidium* stage. After a time, numerous perithecia are formed on it, at first yellow, but afterwards becoming black, each of which bears on its surface a number of stiff hairs, hooked at the tip. For general structure, *see* references just given.

The leaves of Willows are often spotted by the growth on them of certain Moulds, and of such genera as *Septoria* and its allies, which are generally regarded as young conditions of **Pyrenomycetes** (which *see* for structure); but, beyond rendering the leaves unsightly towards the end of autumn, they do not materially injure the trees. The trunks of old Willow-trees are liable, like almost all other trees, to serious injury from the growth in them of mycelium of some of the larger Fungi, the presence of which is indicated by the appearance, on the exterior of the infected portions of the trunk, of mushrooms, *Polypori,* or other reproductive bodies, varying according to the species of the Fungi. Trees thus infested are not worth preservation, and had better be used as firewood than be left as centres of infection. The Fungi that grow on the leaves are best got clear of by sweeping up and burning all fallen leaves in autumn.

Salix—*continued.*

Insects. Several hundred species of insects are known to feed more or less upon Willows; but only a comparatively small number are so hurtful as to require notice here. Some of the latter are chiefly or wholly associated with the Sallows allied to *Salix Caprea.*

The trunks of Willows are very frequently tenanted by larvæ of *Aromia moschata* (*see* **Musk Beetle**) and of the **Goat Moth** (which *see*), and in some districts the twigs of Osiers suffer much from the burrows of larvæ of the Clearwing Moths, *Sesia formicæformis* and *S. bembeciformis* (*see* **Sesia**). For the proper remedies against these insects, *see* the headings quoted.

Certain species of Sawflies (*e.g., Cryptocampus angustus, C. pentandræ*, &c.), one or two Beetles (*e.g., Saperda populnea*), and some Gall-midges (*e.g. Cecidomyia salicina*), produce galls in the form of tapering swellings on the twigs of Osiers; while other species of Gall-midges (*C. rosaria*, &c.) cause the leaves at the tips of the twigs to become crowded into a stunted rosette. These gall-makers can best be reduced in numbers by cutting off the twigs while the galls are still young, and the larvæ too immature to survive the withering of their food.

The leaves are liable to be devoured by **Cockchafers**, by species of **Rhynchites,** and, worst of all, by the Willow-leaf Beetle (*see* **Phratora vitellinæ**). For an account of these insects, *see* the above headings. In some parts of the Fen districts, Osiers have been very much destroyed by the last-named species, but Paris green is now used with success to limit its ravages. Some allied Beetles, of the group *Chrysomelidæ*, may occasionally injure Willows, but are not often sufficiently numerous to require special treatment.

The larvæ of a few Butterflies, of many species of Moths, and of a good many Sawflies, feed, more or less exposed, on the leaves of Willows; but an enumeration of the species is not needed, since their general habits are much alike, and the same treatment is employed to get clear of them, viz., to collect and destroy the creatures, whether by hand-picking, or by shaking the branches over sheets or other surfaces.

The leaves of Willows are very liable to be thickly studded with Sawfly galls, some resembling a small bean in shape, imbedded in the leaf-blade singly or in pairs (the work of *Nematus viminalis*, also known as *N. gallarum*), or like peas in form, attached to the lower surface of the leaf by one side (galls of *N. gallicola*, &c.). These galls often greatly disfigure the leaves, but do not seriously affect the health of the plants. The leaves, if necessary, should be removed, while the galls are young, and allowed to wither. The same method may be made use of against the smaller galls, such as the fleshy tubes of *Cecidomyia marginem-torquens* along the leaf-margins of *S. viminalis*, or the warty galls of various Mites on the surfaces of the leaves, especially on Sallows allied to *S. Caprea.*

The species described below are hardy trees, except where otherwise stated.

S. acutifolia (acute-leaved). A synonym of *S. daphnoides.*

S. alba (white).* White Willow. *fl.*, catkins appearing with the leaves, slender, loose, erect, the scales linear. May. *l.* narrowly lanceolate, long-acuminate, 2in. to 4in. long, silky on both sides, glandular-serrate; petioles eglandular. Trunk 20ft. in girth; bark fissured; twigs silky. *h.* 80ft. Europe (Britain), &c. (Sy. En. B. 1309.)

S. a. cærulea (blue). *l.*, old ones glabrous, glaucous beneath. Twigs olive. (Sy. En. B. 1310.)

S. a. vitellina (yolk-of-egg-coloured). Golden Willow. *fl.*, scales of catkins longer than in the type. *l.*, old ones glabrous above. Twigs yellow or reddish. (Sy. En. B. 1311.)

S. ambigua (ambiguous). A synonym of *S. nigra.*

S. babylonica (Babylonian).* Weeping Willow. *fl.*, catkins nearly 1in. long, sub-cœtaneous, few-leaved, very slender, shortly curved; scales ovate-lanceolate. May. *l.* narrow-lanceolate, 3in. to 6in. long, very long and rather obliquely acuminate, serrulated,

Salix—*continued.*

often glaucescent beneath; stipules semi-lunar or obtuse; branches often very loosely and very long-pendulous. Buds very acute. *h.* 30ft. Levant, 1730. (B. F. F. 59.) SYN. *S. pendula.*

S. b. annularis (ringed). This form is peculiar on account of the blade of the leaves being twisted back, so as to form a kind of ring.

FIG. 403. MALE CATKIN OF SALIX CAPREA.

S. Caprea (Caprea).* Common Sallow; Goat Willow. *fl.*, catkins silky, preceding the leaves; males 1in. long, very stout; females lengthening to 3in. April and May. *l.* elliptic, oblong-ovate, or oblong-lanceolate, acute or acuminate, cuspidate, 2in. to 4in. long, dark green above, tomentose beneath, the

FIG. 404. FEMALE CATKIN OF SALIX CAPREA.

margins narrowly recurved. Europe (Britain). A silvery tree or large shrub, the earliest-flowering of the British Willows. The twigs with catkins, gathered on Palm Sunday, are called Palm-branches. See Figs. 403 and 404. (Sy. En. B. 1331.)

S. C. cinerea (waxy). *fl.*, male catkins less stout than in the type, opening later. *l.* smaller, narrower, from elliptic-oblong to oblanceolate, undulated at the margins, pubescent above. Buds and twigs tomentose. *S. aquatica* and *S. oleifolia* are mere forms of this sub-species.

S. C. pendula (drooping). Kilmarnock Weeping Willow. A variety remarkable for the very decided pendulous character of its branches.

S. daphnoides (Daphne-like). Violet Willow. *fl.*, catkins stout, sessile, clothed with silky hairs, appearing before the leaves; scales black-pointed. April. *l.* narrow-oblong or linear-lanceolate, very acuminate, 3in. to 6in. long, acutely serrated, with persistent, glaucous bloom, shining above. Twigs violet. *h.* 10ft. to 20ft. Europe (naturalised in England). (B. F. F. 62; F. D. 2919.) SYN. *S. acutifolia.*

S. falcata (sickle-shaped). A synonym of *S. nigra falcata.*

S. fragilis (fragile). Crack Willow; Withy. *fl.*, catkins usually spreading, stout, appearing with the leaves; males 1in. to 2in. long; females slender, often longer. April and May. *l.* lanceolate, long-acuminate, 3in. to 6in. long, glabrous, glandularly serrated, pale or glaucous beneath, the young ones hairy. Trunk sometimes 20ft. in girth; branches spreading obliquely; twigs yellow-brown, very fragile at the junction, polished. *h.* 50ft.

Salix—*continued.*

to 90ft. Europe (Britain). See Fig. 405. (Sy. En. B. 1306.) *S. decipiens* is a variety with smaller leaves, and orange or crimson twigs.

FIG. 405. BRANCHLET, WITH FEMALE CATKINS, OF SALIX FRAGILIS.

S. lucida (shining). *fl.*, catkins pedunculate, borne on the summit of lateral, leafy branches of the season; scales greenish-yellow, more or less hairy. May and June. *l.* ovate-oblong or lanceolate and narrow, usually with a long, tapering point, smooth and shining on both sides, serrated; stipules oblong and toothed. Branches very brittle at the base. North America. A beautiful species, sometimes flowering at a height of 3ft., sometimes becoming a small, bushy tree of 12ft. to 15ft. (T. S. M. 310.)

S. nigra (black). *fl.*, catkins similar to those of *S. lucida*; scales short and rounded, woolly. May and June. *l.* narrow-lanceolate, pointed and tapering at each end, serrated, smooth (except on the petiole and midrib) and green on both sides; stipules small, deciduous. Branches very brittle at base; bark rough and black. *h.* 15ft. to 25ft. North America. (T. S. M. 307.) SYN. *S. ambigua.*

S. n. falcata (sickle-shaped). *l.* elongated-falcate; stipules large, broadly lunate, reflexed. SYNS. *S. falcata, S. Purshiana.*

S. pendula (drooping). A synonym of *S. babylonica.*

FIG. 406. BRANCHLET, WITH MALE CATKIN, OF SALIX PENTANDRA.

S. pentandra (five-stamened). Bay-leaved Willow. *fl.*, catkins shortly pedunculate; males 1in. to 2in. long, erect, at length

Salix—*continued.*

pendulous; stamens five; females shorter; scales pale. May and June. *l.* elliptic or ovate- or obovate-lanceolate, acuminate, 1in. to 4in. long, glandularly serrulated, fragrant, viscid, shining, paler and reticulated beneath; stipules ovate-oblong or absent. Bark brown. Europe (Britain). A shrub 6ft. to 8ft., or tree 20ft. high. The latest-flowering Willow. See Fig. 406. (Sy. En. B. 1303.) *S. cuspidata* is probably a hybrid between this species and *S. fragilis.*

S. phylicifolia (Phylica-leaved).* Tea-leaved Willow. *fl.*, catkins sessile, bracteate; scales linear-oblong, acute, black. April and May. *l.* ovate-oblong or elliptic-lanceolate, quite glabrous, shining above, glaucous beneath; stipules very small or absent. *h.* 10ft. Europe (Britain). A very handsome large bush or small tree; when fully developed, it is conspicuous from its spreading, shining, chestnut or reddish branches, and glistening green and glaucous foliage. *S. nigricans* is closely related to this species. The following British forms have been described as species: (1) Erect, with silky capsules, *S. Croweana, S. Davalliana, S. Dicksoniana, S. nitens, S. tenuior, S. Weigeliana.* (2) Erect, with glabrous or nearly glabrous capsules, *S. Borreriana, S. laxiflora, S. phillyreæfolia, S. propinqua, S. tenuifolia, S. tetrapla.* (3) More or less decumbent and rooting, with silky capsules, *S. radicans.* (Sy. En. B. 1334 to 1346.) *S. laurina*, a small, handsome tree, 20ft. to 30ft. high, is probably a hybrid between *S. phylicifolia* and *S. Caprea.*

FIG. 407. TWIG BEARING MALE CATKINS, AND LEAF, OF SALIX VIMINALIS.

S. purpurea (purple). Purple Osier. *fl.*, catkins sub-sessile, ¾in. to 1½in. long, opposite or alternate, erect, then spreading or recurved, cylindric; scales purple-black above. March and April. *l.* often sub-opposite, thin, linear-lanceolate, serrulated, glabrous, 3in. to 6in. long, sparingly hairy when young, shortly petiolate. Bark red or purple. *h.* 5ft. to 10ft. Europe (Britain). An erect or decumbent shrub. *S. Lambertiana, S. ramulosa*, and *S. Woolgariana* are varieties. (Sy. En. B. 1316-1319.) *S. Doniana* and *S. Pontederana* are hybrids between this species and, respectively, *S. repens* and *S. cinerea.*

S. Purshiana (Pursh's). A synonym of *S. nigra falcata.*

S. rubra (red). *fl.*, filaments usually more or less free. *l.* silky beneath. A common and very variable Osier-bed shrub, the result of a cross between *S. purpurea* and *S. viminalis.* (Sy. En. B. 1320.) The following is a form:

S. r. Helix (Helix). Rose Willow. *fl.*, filaments united at the top. *l.* sub-opposite. This plant bears fascicles of diseased leaves, owing to the punctures of a Cynips; hence the common name.

S. Russelliana (Russell's). A synonym of *S. viridis.*

S. triandra (three-stamened). Almond-leaved or French Willow. *fl.*, catkins shortly pedunculate, 1in. to 2in. long, slender, appearing with the leaves, the females narrow; stamens three. April to June. *l.* linear- or oblong-lanceolate, acuminate, glandularly

Salix—*continued.*

serrated, 2in. to 4in. long, glabrous, glaucous beneath; stipules large, semi-cordate. Bark flaking. Twigs terete. *h.* 20ft. Arctic Europe (Britain) and North Asia. (Sy. En. B. 1313.) SYN. *S. Villarsiana.* The following varieties were formerly regarded as distinct species:

S. t. amygdalina (Almond-like). *l.* rounded at the broad base, glaucous beneath. Twigs furrowed.

S. t. Hoffmanniana (Hoffmann's). *l.* broader at base than in the type, green beneath. Twigs terete.

S. Villarsiana (Villars'). A synonym of *S. triandra.*

S. viminalis (twiggy). Osier. *fl.*, catkins golden-yellow, sessile, ¾in. to 1in. long, opening long before the leaves; scales brown, oblong. April to June. *l.* linear-lanceolate, acuminate, 4in. to 10in. long, narrowed into the petioles, reticulated above, silvery-silky beneath, the margins revolute, quite entire. Branches long and straight, the young ones silky, the adults polished. *h.* 30ft. Europe (Britain). Shrub or small tree. See Fig. 407. (Sy. En. B. 1322.) *S. Smithiana* and *S. stipularis* are supposed to be hybrids between this species and *S. Caprea* or, in the latter, *S. cinerea.* Both closely resemble *S. viminalis.*

S. viridis (green). *fl.*, catkins on short, leafy, lateral branches, spreading or recurved, cylindrical, dense in flower, lax in fruit. May and June. *l.* narrowly lanceolate-elliptic, attenuated at base and long-acuminate at apex, or equally attenuated at each end, glandular-serrated, glabrous on both sides when mature; young ones silky. Young branches downy. *h.* 30ft. Europe (Britain). (Sy. En. B. 1808.) SYN. *S. Russelliana.*

SALLOW. A common name for several species of *Salix*, notably *S. Caprea.*

SALLOW THORN. *See* **Hippophae.**

SALMEA (named in honour of Prince Charles of Salm-Dyck, in Holland, an enthusiastic cultivator of plants). SYN. *Hopkirkia.* ORD. *Compositæ.* A genus comprising about a dozen species of erect, sarmentose, or climbing, stove shrubs, inhabiting Mexico and the West Indies. Flower-heads white, rather small, discoid; involucre short, turbinate or campanulate, the bracts few-seriate, imbricated; receptacle conical or elongated; achenes laterally compressed; cymes corymbose, forming a pyramidal panicle at the tips of the branches. Leaves opposite, petiolate, entire or toothed. The two species described below are pretty plants, and thrive in a light, rich soil. They may be readily increased by cuttings of the young wood, inserted in sand, under a glass, in heat.

S. hirsuta (hairy). *fl.-heads* ternately sub-sessile, oblong, in trichotomous corymbs; involucre two or three-seriate. August. *l.* 3in. to 5in. long, ovate or oblong-lanceolate, acuminate, denticulate-repand or sub-entire, scabrous-hispidulous above, villous-tomentose beneath. Branches villous-pubescent. Jamaica, 1823. Trailer.

S. scandens (climbing). *fl.-heads* hemispherical. June. *l.* ovate, acuminate, sub-entire, glabrous. Stem climbing, and, as well as the branches, smooth towards the apex. *h.* 6ft. Vera Cruz, 1820. (B. M. 2062.)

SALMIA (of Cavanilles). A synonym of **Sanseviera** (which *see.*)

SALMIA (of Willdenow). A synonym of **Carludovica** (which *see*).

SALMON BERRY. *See* **Rubus spectabilis.**

SALPICHLÆNA. Included under *Blechnum.*

SALPICHROA (from *salpinx*, a tube, and *chroos*, skin; alluding to the form and texture of the flowers). SYNS. *Busbeckea, Salpichroma.* ORD. *Solanaceæ.* A genus consisting of about ten species of stove or greenhouse herbs, sub-shrubs or shrubs, natives of extra-tropical South America or the Andes. Flowers white or yellow, sometimes 2in. to 3in. long; calyx five-fid or five-parted; corolla long, tubular or urceolate, the lobes five, acute, induplicate-valvate, often short, erect or spreading; stamens affixed above the middle of the tube; pedicels solitary. Leaves entire, rather long-petiolate, often rather small. *S. glandulosa*, the only species introduced, is a stove shrub, requiring culture similar to **Juanulloa** (which *see*).

S. glandulosa (glandular). *fl.* yellow; corolla eighteen to nineteen lines long, the throat nearly ½in. in diameter; peduncles filiform, nodding at apex. July. *l.* twin, long-petiolate, cordate-ovate, seven to eleven lines long, glandular-pubescent, often hoary-tomentose. Stem sub-erect, much branched. *h.* 2ft. Chili, 1844.

SALPICHROMA. A synonym of **Salpichroa** (which *see*).

SALPIGLOSSIS (from *salpinx*, a tube, and *glossis*, a tongue; in allusion to the tongue-like style in the mouth of the corolla). ORD. *Solanaceæ.* A small genus (two or three closely-related species) of greenhouse or hardy, annual, biennial, or perennial, viscous-pubescent herbs, natives of Chili. Flowers few, rather long-pedicellate, often rather large; calyx tubular, five-fid; corolla obliquely funnel-shaped, the throat ample, campanulate; lobes five, plicate, emarginate, erecto-patent; perfect stamens four, included. Leaves entire, sinuate-toothed, or pinnatifid. *S. sinuata*, the species known in gardens, is a very ornamental and useful border plant; it requires culture similar to **Schizanthus** (which *see*).

S. integrifolia (entire-leaved). A synonym of *Petunia violacea.*

S. linearis (lined). A synonym of *Petunia intermedia.*

FIG. 408. UPPER PORTION OF PLANT OF SALPIGLOSSIS SINUATA.

S. sinuata (wavy).* Scalloped Tube-tongue. *fl.* dark purple, straw-coloured, or variously painted, often striped, showy; corolla usually 1½in. long. Summer. *l.*, lower ones petiolate, elliptic-oblong, sinuate-toothed or pinnatifid; upper ones more entire; bracts sessile, quite entire. *h.* 2ft. 1820. A sub-erect, branched, viscous-pubescent, greenhouse or hardy annual. See Fig. 408. It is known in gardens by the following names: *S. atropurpurea* (B. M. 2811; B. R. 1518; S. B. F. G. 271), *S. Barclayana* (S. B. F. G. ser. ii. 112), *S. picta* (B. M. 3365; L. B. C. 1652; S. B. F. G. 258), and *S. straminea* (H. E. F. 229; S. B. F. G. 231). There are several garden varieties, including *coccinea* (L. & P. F. G. iii. 100) and *flava* (G. M. B. i. p. 57).

SALPIXANTHA. A synonym of **Geissomeria** (which *see*).

SALSAFY (*Tragopogon porrifolium*). A hardy biennial, cultivated for the use of its long, white, fleshy roots, which are cooked and served in various ways. It re-

Salsafy—*continued.*

quires an open situation and deep soil, but the latter should not be newly manured for the crop, as this tends to make the roots forked. Seeds may be sown at the end of March, or any time during April, in drills 1ft. apart, and the plants thinned, when large enough, to 9in.

FIG. 409. SALSAFY.

asunder in the rows. The roots (see Fig. 409) will be ready for use from October through the winter. A supply should be lifted before severe frost sets in, and stored in sand, in a cool shed. Salsafy is not usually required in large quantities.

SALSOLA (a diminutive from *salsus*, salted; alluding to the salty soil in which the plant is found). Alicant Soda; Saltwort. ORD. *Chenopodiaceæ*. A genus comprising about forty species of mostly hardy herbs, shrubs, or sub-shrubs, of variable habit, mainly natives of saline districts in temperate regions. The ashes of *S. Kali*, the Prickly Saltwort, a British plant, and of *S. Soda*, a South European and North American species, were formerly much used in the production of an impure carbonate of soda, known as Barilla (*see* remarks under **Salicornia**). The species have no horticultural value.

SALSOLACEÆ. Included under *Chenopodiaceæ*.

SALT. A general term used by chemists to signify compounds formed by the union of an acid with a metal, or with some other substance of similar chemical powers, and known as a base. For example, Sodium Carbonate is made up of Carbonic Acid, and of the metallic base

Salt—*continued.*

Sodium. So Ammonium Nitrate consists of Nitric Acid united with the base Ammonium. But the word "Salt" is often used by itself, or in the expression "Common Salt," to denote Sodium Chloride, the substance so familiar to everyone, and so essential as a part of our daily food. As the name Sodium Chloride denotes, it is composed of Sodium and Chlorine, there being in it one equivalent of each, or 23 parts of Sodium to 35½ of Chlorine by weight. Both elements have been found to occur in the ashes of all plants, and in special abundance in those of maritime districts. There is great doubt as to the use of each element, since experiments tend to show that neither is absolutely essential to any plant. Yet common Salt has long been used as a manure, and there is a very general belief among agriculturists that it is valuable in strengthening Cereals, and increasing the yield from them, and also in destroying noxious insects and weeds. Experiments on its use have afforded no very definite results. Dr. Voelcker found that it rather lessened the yield of straw, and had no appreciable effect on the grain, and that it restrained any tendency to rank growth. He also found that, when supplied to Mangel-Wurzel, it increased the weight of the crop. It is able to bring nitrogenous substances in the soil, and in farmyard and artificial manures, into a condition suited for being absorbed by plants; hence, it is probably of use in this way. It has been observed that it produces markedly useful results when supplied along with nitrogenous manures. There is usually no need to supply Salt to soils on the sea-coast, as they are already supplied from the sea by spray. The refuse Salt of the fish or ham-curer is the cheapest and most suitable form in which to employ Salt as manure.

SALTPETRE (Nitrate of Potassium). A substance found in quantities as a natural product in Hindostan, and also much prepared artificially from heaps of organic remains allowed to decay in contact with Carbonate of Potassium. Its high price renders the use of it as manure impracticable, despite the good results that have attended its employment in experimental farming. Its value is due to its supplying both Potassium and Nitrogen in a form readily available to plants. Its place as a manure, in commerce, is supplied, in so far as yielding nitrogenous food, by Nitrate of Sodium, which is found in very extensive beds in South America, and can be sold, after being freed of excess of earthy substances, at a sufficiently low price to permit of its profitable employment by farmers. Saltpetre increases the yield of Cereals, and of Clover and other leguminous plants, and seems peculiarly to promote the growth of the green parts.

SALT-TREE. A name applied to several species of *Halimodendron*.

SALTWORT. *See* **Salsola.**

SALTWORT, BLACK. A common name for **Glaux** (which *see*).

SALVADORA (named after J. Salvador, a Spanish botanist). ORD. *Salvadoraceæ*. A small genus (two or three species) of stove, evergreen shrubs or trees, natives of East Africa, Arabia, and India. Flowers small, racemose or spicate, on the branches of terminal or axillary panicles; calyx lobes four, imbricated; corolla campanulate, the tube with four small teeth between the bases of the filaments, the lobes four, imbricated; stamens four. Leaves opposite, entire, rather thick, often pale. *S. persica*, the only species introduced, is supposed, by many authorities, to be the Mustard-tree of Scripture (Matt. xiii. 32). It thrives in well-drained loam, and may be increased by cuttings, inserted in sand, under a glass, in heat.

Salvadora—*continued.*

S. indica (Indian). A synonym of *S. persica.*

S. persica (Persian). Kiknel Oil-plant. *fl.* white, pedicellate, scattered; panicles 2in. to 5in. long, often very compound, numerous in the upper axils. June. *l.* ovate or oblong, obtuse, 1½in. long. Arabia, India, &c., 1850. A small, glabrous tree. (B. F. S. 247, under name of *S. Wightiana.*) SYN. *S. indica.*

SALVADORACEÆ. A small natural order of glabrous or scarcely powdery, unarmed or spiny trees or shrubs, natives of tropical and sub-tropical, mostly Western Asia, Africa, and the Mascarene Islands. Flowers hermaphrodite or dicœcious, regular, forming a trichotomously-paniculate inflorescence; calyx free, campanulate or ovoid, three or four-toothed or four-fid; corolla gamopetalous and campanulate, or polypetalous, the lobes or petals four, imbricated in æstivation; stamens four, alternating with the lobes or petals, the filaments filiform or dilated at base; anthers two-celled; panicles short, axillary, often reduced to dense, sessile fascicles. Berries fleshy or sub-drupaceous, indehiscent, usually one-seeded. Leaves opposite, entire. *Salvadora persica* bears edible berries; the bark of the root contains acrid and vesicant properties, and that of the stem is a tonic. The order comprises three genera—*Azima, Dobera,* and *Salvadora*—and only eight or nine species.

SALVIA (the old Latin name, used by Pliny, from *salveo,* to save or heal; indicative of the supposed medicinal qualities of some of the species). Sage. Including *Sclarea.* ORD. *Labiatæ.* A vast genus (nearly 450 species have been described) of stove, greenhouse, or hardy, annual, biennial, or perennial herbs, sub-shrubs, or shrubs, of variable habit, broadly dispersed over the temperate and warmer regions of the globe. Flowers variable in colour, rarely yellow, mostly showy, sessile or shortly pedicellate; calyx ovoid, tubular, or campanulate, bilabiate, the upper lip entire or with three minute teeth, the lower one bifid; corolla tube included or exserted, equal, swollen, or enlarged above, the limb bilabiate; upper lip erect, concave or arched, entire or scarcely notched; lower one spreading, three-lobed, the middle lobe often notched or divided; perfect stamens two; whorls two to many-flowered, variously spicate, racemose, or paniculate, or rarely all axillary. Nutlets ovoid, triquetrous or slightly compressed, smooth. Leaves entire, toothed, incised, or pinnatisect; floral ones often changed into bracts; cauline ones rarely conformed. A large number of the species have been introduced; a selection of the most desirable kinds is given below. Two species—*S. pratensis* and *S. Verbenaca*—are indigenous to Britain. *S. officinalis* is the well-known common Sage, much used in cooking. Salvias may readily be raised from seeds; when these can be obtained, they should be sown thinly, and placed in a little warmth. Cuttings of the tender species and varieties root very readily in heat, if they are quite soft, and in a growing state. As greenhouse plants for autumn and winter-flowering, some of the Salvias are very showy and useful. Amongst them may be specially mentioned: *S. azurea* (var. *grandiflora*), *S. cacalœfolia, S. involucrata* (var. *Bethellii*), *S. rutilans, S. splendens* (and its variety *Bruantii*). For spring-flowering, *S. boliviana, S. fulgens,* and *S. gesneræflora,* are amongst the best. *S. patens* is one of the most distinct and beautiful of deep blue-flowered plants in cultivation, and is equally well suited for greenhouse decoration in summer, or for planting in beds outside, to flower at the same season. Salvias like a rich soil, particularly when grown in pots; loam and manure, in about equal parts, is not too strong for them. The plants may be grown outside during summer, but they must be housed before frost appears, as they cannot withstand severe weather. Salvias are not well adapted for room decoration: under such treatment, their flowers very soon drop. The plants should be propagated, for all purposes, in spring and early summer; and, in most cases, it is advisable

Salvia—*continued.*

to raise some new ones each year. Except where otherwise stated, the species described below are hardy, herbaceous perennials.

S. albo-cærulea (white and blue).* *fl.*, calyx campanulate-tubular, glandular-pubescent; corolla white, the lower lip intense indigo, 1in. or more in length, showy; whorls four to many-flowered; raceme simple, 6in. to 12in. long. Summer. *l.* petiolate, oblong-lanceolate, long-acuminate, 4in. to 6in. long, crenate-serrate, decurrent into the petioles, nearly glabrous above, softly pubescent beneath. Stems erect. *h.* 3ft. Mexico. Greenhouse sub-shrub. (F. d. S. 1340; R. G. 221.)

S. amarissima (very bitter). *fl.* blue; calyx pilose-hispid; corolla nearly thrice as long as the calyx; whorls distinct, rather remote, about ten-flowered; racemes 3in. to 6in. long, simple, dense-flowered. August. *l.* petiolate, ovate-cordate, crenate, 1½in. long, wrinkled above, pale or canescent beneath. Stem erect, branched, 2ft. high, pilose-hispid. Mexico, 1803. Greenhouse perennial. (B. R. 347.)

S. angustifolia (narrow-leaved). *fl.* very shortly pedicellate; calyx lips half the length of the tube; corolla blue, the lower lip as wide as long, the middle lobe emarginate or undulate; inflorescence twiggy, slender, of distant, few-flowered clusters. May. *l.* linear, 1½in. to 3in. long, entire or obscurely denticulate, acute, somewhat petioled. *h.* 2ft. Mexico, 1816. Greenhouse perennial. (B. R. 1554; S. B. F. G. ser. ii. 219.)

S. argentea (silvery). *fl.*, calyx sessile, eight to nine lines long; corolla pinkish-white, showy, nearly three times as long as the calyx; whorls six to ten-flowered, remote; panicle ample, but slightly branched. June. *l.*, radical ones petiolate, lower cauline ones sessile, 6in. to 8in. long, cuneate at base, sinuate-lobed, erose, woolly, wrinkled, white-veined; floral ones very broad, acuminate, concave, persistent, pilose. Stem erect, villous. *h.* 3ft. Mediterranean region, 1759. Biennial. (S. F. G. i. 27.)

S. asperata (rough).* *fl.* white; calyx campanulate, hispid-ciliate; corolla tube equalling the calyx, the hood falcate and compressed; whorls distant, six to ten-flowered; racemes slightly branched. July. *l.* petiolate, broadly sub-cordate-ovate, shortly acuminate, erose-crenate, much wrinkled, villous, scarcely canescent beneath; cauline ones broad, acuminate, mostly longer than the calyx. Stem glandular-pubescent and pilose. *h.* 2ft. Cashmere, 1854. (B. M. 4884.)

S. aurea (golden). *fl.*, calyx ½in. long, campanulate, villous; corolla of a beautiful golden-colour, thrice as long as the calyx, the hood large, slightly falcate and compressed; whorls two-flowered, scarcely distinct; racemes dense, 2in. to 4in. long. July. *l.* ½in. or scarcely 1in. long, petiolate, somewhat ovate-rotundate, obtuse, entire or sinuate, hoary; floral ones sessile, villous, persistent. Branches hoary-tomentose. *h.* 3ft. or more. Cape of Good Hope, 1731. Greenhouse shrub. (B. M. 182.)

S. austriaca (Austrian). *fl.*, calyx nearly ½in. long, very villous; corolla yellowish-white, thrice as long as the calyx, the tube slightly exserted, the upper lip falcate; whorls nearly six-flowered, the lower ones distant, the upper ones approximating; racemes slightly branched. June. *l.*, radical ones 3in. to 4in. long, petiolate, broadly ovate, entire or erose-toothed, cordate, rounded, or cuneate at base, wrinkled above, pubescent beneath; cauline ones one or two pairs, sessile 2in. long; floral ones five lines long, ovate, acuminate. Stem erect, 2ft. to 3ft. high, nearly simple. Austria, 1776. (B. R. 1019; J. F. A. 112.)

S. azurea (azure-blue). *fl.*, calyx oblong-campanulate, obscurely bilabiate; corolla deep blue, sometimes varying to white, the lower lip sinuately three-lobed and emarginate; pedicels short; inflorescence spike-formed. August. *l.*, lower ones lanceolate or oblong, obtuse, denticulate or serrate, tapering into a slight petiole; upper ones narrower, often linear, entire; floral ones or bracts subulate, somewhat persistent. *h.* 6ft. North America, 1806. Plant glabrous or puberulous. (B. M. 1728.)

S. a. grandiflora (large-flowered). *fl.*, calyx tomentulose-sericeous; inflorescence denser than in the type. Plant cinereous-puberulous. SYN. *S. Pitcheri* (F. M. n. s., 455; G. C. n. s., xiv. 685).

S. Bethellii (Bethell's). A garden variety of *S. involucrata.*

S. bicolor (two-coloured).* *fl.*, calyx four to five lines long, glutinous-hispid, with subulate-acuminate teeth; corolla thrice as long as the calyx, the upper lip bluish-violet, golden-dotted, the lower one whitish; whorls six-flowered, distinct; racemes 1½ft. to 2ft. long, many-flowered. June. *l.*, lower ones petiolate, ample, ovate, incised-toothed, pinnatifid or palmately lobed; middle ones petiolate, ovate-lanceolate; upper ones sessile; all cordate at base, and glutinous-pubescent. Stem thick, 2ft. to 3ft. high, scarcely branched. Barbary, 1793. A very pretty and distinct, hardy biennial. (B. M. 1774; P. M. B. ix. 271.)

S. boliviana (Bolivian).* *fl.* many in a whorl; calyx ¾in. long, dull purple or green and purple; corolla bright scarlet, 3in. long, slightly curved, glabrous, the upper lip very small, the lower shortly three-lobed; panicle sub-sessile, 2ft. high, branched. Autumn. *l.* 3in. to 6in. long, ovate-cordate, acute, wrinkled; petioles slender, 1in. to 3in. long. *h.* 4ft. Bolivia, 1856. Greenhouse under-shrub. (B. M. 6714; F. d. S. 1148.)

Salvia—*continued.*

S. cacaliæfolia (Cacalia-leaved).* *fl.*, calyx campanulate, the teeth aristate-acuminate; corolla deep blue, many times longer than the calyx, having a very broad tube; whorls two-flowered; racemes branched. June. *l.* petiolate, broadly deltoid, broadly sub-hastate-cordate at base, rather thick, pubescent above, reddish or whitish and softly villous beneath. Stem erect, pubescent. *h.* 3ft. Mexico, 1858. Greenhouse perennial. (B. H. 1862, 100; B. M. 5274; F. d. S. 2318.)

S. Camertoni (Camerton's). *fl.* brownish-purple; calyx softly glandular-pilose; corolla 1in. long, the tube slightly curved. Summer. *l.* petiolate, ovate or cordate-ovate, acuminate, rounded at base, 1in. to 1½in. long, crenate-serrated, ciliated, shortly hispid above, paler and glabrous beneath. Stem 3ft. to 5ft. high, sub-shrubby. Probably Mexico. (R. G. 125.)

S. Candelabrum (candelabrum-like).* *fl.*, calyx sharply ribbed, tinged with purple; corolla white, and striated with pale purple, thrice as long as the calyx, externally hairy; lower lip deep rich violet, variegated and streaked with white at the throat; panicle terminal, erect, the branches spreading, each bearing a cyme of several flowers. July. *l.* oblong-lanceolate, rather obtuse, 3in. to 4in. long, crenulate, very loosely wrinkled, hairy, glandular-dotted. Stem erect, 3ft. to 4ft. high. Mexico, 1845. Half-hardy sub-shrub, exhaling a powerful aromatic odour. (B. M. 5017; F. d. S. 1344; L. & P. F. G. ii. p. 161, 217.)

S. canescens (hoary). *fl.*, calyx tubular-campanulate; corolla purple, nearly thrice as long as the calyx, the tube shortly exserted, the upper lip slightly falcate; whorls remote; racemes branched, villous-viscous. July. *l.* lanceolate-oblong, entire or sinuate-lobed, long-narrowed at base, wrinkled, above loosely, below densely, white-woolly; floral ones very broad, acuminate, concave, persistent, rather shorter than the calyx. Stem 2ft. high, white-woolly at base. Caucasus. (B. R. 1838, 36.)

S. carduacea (Thistle-leaved).* *fl.*, calyx long-woolly; corolla lavender-coloured, 1in. long, its tube slightly exserted; upper lip erose-toothed or fimbriated and two-cleft; lower one with small, lateral, erose lobes, and a larger, flabelliform, deeply multifid middle one. July. *l.* oblong, sinuately-pinnatifid, Thistle-like. Stem stout, simple, 1ft. or more high, naked and scape-like, only at base subtended by a cluster of leaves. California, 1854. (B. M. 4874.)

S. chamædryoides (Chamædrys-like).* *fl.* geminate or few in the clusters of the raceme; calyx cylindrical-campanulate, ¼in. long; corolla blue, upwards of ½in. long, the middle lobe of the lower lip broader than long, obcordate-lobed. July. *l.* rather thick, oblong or elliptical, on short petioles, more or less crenulate, obtuse, less than 1in. long; floral ones bract-like, caducous. *h.* 1ft. Mexico, 1795. A much-branched, canescent and scabrous, greenhouse shrub. (B. M. 808; L. B. C. 576; A. B. R. 416, under name of *S. chamædrifolia.*)

S. coccinea (scarlet).* *fl.*, calyx lips half the length of the tube; corolla deep scarlet, 1in. or less long, pubescent or puberulous outside, the lower lip twice the length of the upper; raceme twiggy, the clusters few or several-flowered, and rather distant. July. *l.* membranous, veiny, cordate or ovate, mostly acute, crenate, slender-petioled, mostly soft-tomentose beneath. *h.* 2ft. Central and South America, &c., 1772. A greenhouse or half-hardy annual or perennial, canescently pubescent or glabrous, or hairy towards the base.

S. c. major (larger). A tall-growing form, with somewhat larger flowers than those of the type. (B. H. ix. p. 65; R. G. vii. 232.)

S. c. pseudo-coccinea (false-coccinea). A commonly tall form, with stem, petioles, and often floral leaves, conspicuously hirsute. (B. M. 2864, under name of *S. pseudo-coccinea.*)

S. cœlestina (celestial-blue). *fl.* very numerous; corolla of a soft lilac-blue. Summer. *l.* petiolate, oval-elliptic, shortly and broadly rounded at the base, attenuated at the apex, irregularly toothed on the margins. *h.* 2ft. Mexico (?), 1878. Plant whitish-green or incanescent. A very floriferous, greenhouse perennial, of robust habit.

S. colorans (coloured). A garden synonym of *S. splendens.*

S. Columbariæ (Scabious-like). *fl.* small; calyx naked within; corolla blue, hardly exceeding the calyx, its upper lip emarginately bilobed at apex, the lower with small lateral lobes and a much larger, somewhat bilobed middle one; heads many-flowered. Summer. *l.* deeply once or twice pinnatifid, or pinnately parted into oblong, crenately-toothed or incised, obtuse divisions, muticous, wrinkled; involucral floral ones broadly ovate, entire. Stem slender, 6in. to 20in. high, one or two-headed. California. Half-hardy annual. (B. M. 6595.)

S. confertiflora (clustered-flowered).* *fl.*, calyx reddish, ovate-tubular, tomentose, woolly; corolla reddish within, yellowish or reddish outside, clothed with golden wool, half as long again as the calyx; whorls numerous, ten to twenty-flowered; racemes upwards of 1ft. long. August. *l.* petiolate, ovate-oblong, 3in. to 4in. long, slightly acute, crenate, somewhat decurrent, wrinkled and appressedly pubescent above, densely rufous-tomentose beneath; cauline ones ovate, short. Branches rufous-tomentose. *h.* 3ft. Rio Janeiro and Organ Mountains, 1838. Greenhouse sub-shrub. (B. M. 3899; B. R. 1839, 29.)

S. confusa (confused). *fl.*, calyx coloured, striated, pubescent, the teeth all subulate-acuminate; corolla whitish, twice or thrice as long as the calyx; whorls remote, many-flowered; racemes elongated. July. *l.* petiolate, mostly interruptedly pinnatisect, wrinkled, whiter below than in *S. interrupta*; terminal segment large, oblong-lanceolate, narrowed at base; lateral ones one or two on each side. Stem slightly woolly at base. *h.* 4ft. South Europe, 1790. Hardy shrub. SYN. *S. interrupta* (S. B. F. G. 169).

S. dichroa (two-coloured). *fl.*, calyx ¾in. long; corolla 1¼in. long, the upper lip bright blue, pubescent, arcuate, the lateral lobes of the lower lip pale blue, recurved, the mid-lobe white, pendulous; racemes 1ft. or more long, many-flowered. August. *l.*, radical ones petiolate, 6in. to 8in. long, oblong-ovate or ovate-lanceolate, obtuse, narrowed into the petiole, sinuate-serrate, with rounded lobules, pubescent; upper cauline ones sessile. Stem 2ft. to 3ft. high. Greater Atlas, 1871. Plant glandular-pubescent. (B. M. 6004.)

S. discolor (discoloured).* *fl.* in long, terminal spikes; tubular part of the corolla dark purple, almost wholly hidden by the calyx; projecting lips of a violet-black colour. *l.* entire, ovate-oblong, on rather long petioles, nearly 6in. long. *h.* 2ft. to 3ft. or more. Andes of Peru, 1883. (B. M. 6772; G. C. n. s., xix. p. 341, under name of *S. mexicana minor.*)

S. elegans (elegant). *fl.* shortly pedicellate; calyx campanulate, glandular-villous; corolla blood-colour, above 1in. long (nearly six times the length of the calyx); whorls remote, about six-flowered; racemes 4in. to 6in. or more long. Summer. *l.* petiolate, ovate, 1in. to 1½in. long, acuminate, serrate, rounded or narrowed at base, slightly hispid, pubescent, or tomentose above, glabrous beneath; floral ones sessile. Stem 3ft. to 4ft. high, glabrous or scarcely pilose. Mexico and Guatemala. Greenhouse perennial. (B. M. 6448; Ref. B. 228.)

S. farinacea (mealy). *fl.*, calyx densely white-tomentose, often tinged with violet; lower lip of the violet-blue corolla with middle division obcordately two-lobed; inflorescence spike-formed, on a long, naked, interrupted peduncle, of densely many-flowered clusters. Summer. *l.*, lower ones ovate-lanceolate or ovate, obtuse cuneate or rarely subcordate at base, serrate, on slender petioles; upper ones lanceolate or linear-lanceolate, sometimes entire; floral ones subulate or ovate-lanceolate. Stems numerous, in a cluster. *h.* 3ft. Texas, 1847. (R. G. 1002; R. H. 1873, 91.)

S. Forskolei (Forskohl's). *fl.*, calyx four to five lines long, tubular, often coloured at apex, viscous-pubescent; corolla violet, thrice as long as the calyx, the tube nearly straight or recurved, the upper lip emarginate-bifid; whorls at length 1in. or more apart, usually two, rarely four to six-flowered; racemes elongated, nearly simple. July. *l.*, lower ones petiolate, 3in. to 4in. long, ovate, repand-crenate, auricled or lobed at base, villous; cauline ones few, sub-sessile, much shorter than the calyx. Stem 1½ft. high, leafy at base. Orient, 1800. (B. M. 988; S. F. G. 21.)

S. fulgens (brilliant).* *fl.* showy; calyx six to eight lines long, tubular-campanulate; corolla scarlet, nearly 2in. long, villous, the tube exserted and swollen; whorls six-flowered, nearly 1in. apart; racemes 6in. to 12in. long. July. *l.* petiolate, ovate, acute, usually 1in. to 3in. long, crenate-serrate, cordate at base, pubescent above, white-tomentose or woolly beneath. Stem 2ft. to 3ft. or more high; branches numerous. Mexican Mountains, 1829. Greenhouse shrub. (B. R. 1356; L. B. C. 1910; S. B. F. G. ser. ii. 59.)

FIG. 410. FLOWER OF SALVIA GESNERÆFLORA.

S. gesneræflora (Gesnera-flowered).* This magnificent garden species has quite the habit of *S. fulgens*; but the flowers are far more abundant and conspicuous, the upper lip of the corolla is flatter and less shaggy, the tube is longer, and the style is less feathery. *h.* 2ft. Columbia, 1840. Greenhouse herbaceous perennial. See Fig. 410. (F. d. S. 2131; I. H. i. 32; L. & P. F. G. 47.)

S. glutinosa (glutinous). Jupiter's Distaff. *fl.*, calyx tubular, one-third the length of the corolla; corolla pale yellow, often 1½in. long, with an exserted tube and an enlarged throat; whorls distant, loosely few-flowered. July. *l.* petiolate, ovate-oblong, acuminate, cordate-sagittate at base; lower ones often 7in. to 8in. long, the upper ones smaller; floral ones ovate, acuminate, shorter than the calyx. Stem erect, glutinous, pilose. *h.* 3ft. Europe and Central Asia, 1759. (S. B. F. G. 140, under name of *S. nubicola.*)

Salvia—*continued.*

S. Goudotii (Goudot's).* *fl.*, calyx tubular-campanulate, three to four lines long; corolla bright crimson, upwards of 1in. long, the tube long-exserted and enlarged above, the lips sub-equal; whorls six to ten-flowered, sub-secund; racemes simple, 6in. long. Summer. *l.* ovate or ovate-lanceolate, acuminate, nearly 3in. long, crenate-serrate, narrowed at base, pubescent. Branchlets rufous-puberulous or glabrous. *h.* 2ft. Columbia, 1870. Greenhouse shrub. (Ref. B. 229.) SYN. *S. lantanifolia* (of gardens).

S. Grahami (Graham's).* *fl.*, calyx often coloured, tubular, pubescent; corolla purplish-blue, twice as long as the calyx, the lower lip twice as long as the hood; whorls two-flowered; racemes elongated. Summer. *l.* petiolate, oval, obtuse, rounded or cuneate at base, irregularly crenate, nearly glabrous; floral ones ovate, acuminate, ciliated. Branches glabrous or very slenderly pubescent. *h.* 2ft. Mexico, 1829. Greenhouse shrub. (B. R. 1370; L. B. C. 1798; R. G. 242.)

S. Greggii (Gregg's).* *fl.*, calyx narrowly-campanulate, lips half to one-third the length of the tube, lanceolate, acute, nearly straight; corolla carmine, tube twice as long as calyx, throat ventricose, mouth contracted; racemes 2in. long, six to eight-flowered. Autumn. *l.* 1in. to 1½in. long, sub-sessile, linear-oblong, obtuse, narrowed at base, closely gland-dotted, rather dull pale green. *h.* 3ft. Northern Mexico, 1885. Greenhouse shrub. (B. M. 6812.)

S. Heerii (Heer's).* *fl.* pubescent or glandular-pubescent; calyx tubular, irregularly three-toothed; corolla scarlet, thrice as long as the calyx, the tube recurved; whorls two-flowered, secund; racemes terminating the branches and branchlets. Summer. *l.* petiolate, cordate-ovate or lanceolate, acuminate, membranous, crenate-toothed, wrinkled above, slightly canescent beneath; floral ones bract-formed, nearly round, long-acuminate. Stem much branched. *h.* 2ft. to 3ft. Peru, 1855. Greenhouse shrub. (Ref. B. 205; R. G. 115.)

S. hians (gaping).* *fl.* showy; calyx campanulate, bluish, glutinous; corolla of a beautiful blue, thrice as long as the calyx, with an ample, exserted tube and a short, gaping limb; whorls six-flowered; racemes slightly branched. June. *l.* long-petiolate, broadly ovate, broadly cordate-sagittate or truncate at base; floral ones ovate, acuminate, shorter than the calyx. Stem erect, villous. *h.* 2ft. Cashmere, 1830. A pretty perennial, allied to *S. glutinosa*. (B. M. 6517; B. R. 1841, 39; R. G. 1221.)

S. h. plectranthifolia (Plectranthus-leaved). This variety has rather smaller, and less hairy, more deeply violet flowers than the type. (L. & P. F. G. iii. p. 157.)

S. hispanica (Spanish). *fl.*, calyx campanulate, villous-pubescent; corolla blue, shortly exserted, glabrous, four to five lines long; whorls approximate, many-flowered; racemes spike-formed. July. *l.* ovate, acuminate, 2in. to 4in. long, serrated, borne on long petioles; floral ones ovate, exceeding the short pedicels. *h.* 1ft. to 2ft. West Indies (naturalised in Spain), 1739. Hardy, pubescent annual. (B. R. 359.)

S. Horminum (Horminum). *fl.*, corolla purple, half as long again as the pubescent calyx; whorls distant, about six-flowered; racemes simple. June. *l.* petiolate, oval-oblong, rounded or cuneate at base, obtuse, crenate, villous; the upper ones ovate-cordate; floral ones very broad, acute, persistent, rather longer than the calyx, the uppermost ones coloured. Stem erect, villous. *h.* 1½ft. South Europe, 1596. Annual. (S. F. G. i. 20.)

S. Hoveyi (Hovey's). A synonym of *S. ianthina*.

S. ianthina (violet).* *fl.* large; corolla of an intense violet-purple, nearly thrice as long as the calyx, the tube funnel-shaped, the upper lip erect; bracts ovate, acuminate, coloured; whorls six-flowered, clustered. June. *l.* somewhat ovate-cordate, acuminate, crenate, wrinkled, puberulous, paler beneath. Stem erect, 2ft. high, puberulous. Native country uncertain, 1850. Greenhouse perennial. SYN. *S. Hoveyi* (F. d. S. 884; G. C. n. s., xv. p. 145).

S. indica (Indian). *fl.* at first campanulate, afterwards inflated, viscous-pubescent; corolla of a beautiful yellow, spotted with purple, thrice as long as the calyx, the tube scarcely exserted; whorls few, six-flowered, very remote; racemes simple 1½ft. or more long. June. *l.* petiolate, broad or oblong-ovate, acute, slightly toothed or erose-crenate or lobed, broadly cordate at base, glabrous, the lower ones 3in. to 5in. long; floral ones ovate-cordate, reflexed, sessile. Stem erect, slightly pilose. *h.* 3ft. India, 1731. (B. M. 395.)

S. interrupta (interrupted).* *fl.* nearly sessile; calyx deeply grooved, ⅓in. long; corolla dark violet-purple, with a white throat, 1½in. long, 1in. across, the tube red-purple, nearly straight; whorls numerous, 2in. to 3in. apart, five to ten-flowered. May. *l.* 6in. to 10in. long, spreading, pinnatisect, coarsely wrinkled above, white-tomentose below; terminal lobe 2in. to 3in. long, oblong-ovate: lateral segments distant. Stem erect; branches (as well as the inflorescence) viscid-downy. *h.* 3ft. to 4ft. Tangiers, 1867. (B. M. 5860; R. G. 1210.)

S. interrupta (interrupted), of Sweet. A synonym of *S. confusa*.

S. involucrata (involucred). *fl.*, calyx often coloured, tubular campanulate, viscous; corolla rosy, usually long-exserted, three to five times as long as the calyx, the tube swollen, the lips sub-equal; pedicels nearly equalling the calyx; whorls nearly six-flowered, approximating; racemes spike-formed. August.

Salvia—*continued.*

l. petiolate, ovate, acuminate, 2in. to 3in. long, crenate-serrate; floral ones sessile, bract-like, broadly ovate, acuminate, coloured. Stem several feet high, sparsely branched. Mexico, 1824. Greenhouse or half-hardy sub-shrub. (B. M. 2872; B. R. 1205.)

S. i. Bethellii (Bethell's).* *fl.* bright rosy-crimson, in large, whorled spikes terminating the branches; in the bud each whorl surrounded by a pair of large, coloured bracts. *l.* large, cordate-ovate. 1881. A handsome seedling variety, of bold habit. (F. M. 464 and G. C. n. s., xv. p. 49, under name of *S. Bethellii*.)

S. i. Deschampsiana (Deschamps'). *fl.* in ovate, spike-formed, terminal clusters; calyx (as well as the ovate, caducous bracts) bright red; corolla of a lively rose-colour, the tube much inflated. *l.* cordate, acuminate. *h.* 3ft. or more. French gardens, 1869. (R. H. 1869, 134.)

S. lamiifolia (Lamium-leaved). *fl.*, calyx sub-sessile, tubular; corolla blue, scarcely twice as long as the calyx, the tube sub-equal, the upper lip erect, the lower one shorter; whorls six to ten-flowered; racemes elongated. July. *l.* petiolate, ovate, acuminate, often 3in. to 4in. long, crenate-serrate, rounded or cuneate at base, glabrous or rarely slightly pubescent above; floral ones ovate-lanceolate, equalling the calyx. Stem erect, nearly glabrous. *h.* 2ft. West Indies, &c., 1821. Stove shrub. (B. R. 446; B. M. 1294; L. B. C. 377, under name of *S. amœna*.)

S. lantanifolia (Lantana-leaved). A garden synonym of *S. Goudotii*.

S. leonuroides (Leonurus-like). *fl.*, calyx highly glabrous, tubular-campanulate, with three broad lobes; corolla scarlet, nearly twice as long as the calyx, the tube swollen, the lips sub-equal; pedicels shorter than the petioles; whorls about six-flowered, in the axils of the cauline leaves. June. *l.* ovate or rhomboid, obtuse, slightly crenate, truncate or sub-cordate at base, nearly glabrous above, canescent on the veins beneath. Branches sulcate. *h.* 3ft. Peru, 1783. Greenhouse shrub. (B. M. 376, under name of *S. formosa*.)

S. leucantha (white-flowered). *fl.*, calyx ovate-cylindrical, clothed with dense, violet or lavender-coloured wool, paler beneath; corolla white and woolly, about twice as long as the calyx, the tube thick, curved upwards; whorls six to eight-flowered; spike or raceme much elongated, the rachis covered with violet-coloured wool. June. *l.* narrow, oblong-lanceolate, on short petioles, acute, wrinkled, almost glabrous above, downy beneath. Branches woolly. *h.* 1½ft. to 2ft. Mexico, 1847. Greenhouse shrub. (B. M. 4318.)

S. mentiens (deceiving). *fl.*, calyx scarlet at apex, glabrous, four lines long; corolla of a beautiful scarlet, four or five times longer than the calyx, the tube long-exserted, the lips short and sub-equal; whorls remote, few-flowered; racemes simple, elongated. Summer. *l.* petiolate, ovate, acuminate, serrate, rounded at base, glabrous. Stem glabrous below, spreading and pilose at apex. *h.* 1½ft. Brazil, 1870. Warm greenhouse perennial. (Ref. B. 206.)

S. nutans (nodding). *fl.*, calyx scarcely two lines long; corolla violet, four to five lines long, with a straight, spreading hood; whorls nearly six-flowered, approximate; racemes spike-formed, 1in. to 1½in. long, on long peduncles. July. *l.*, sub-radical ones long-petiolate, ovate-oblong, 4in. to 5in. long, doubly crenate sub-cordate at base, wrinkled; floral ones minute, orbicular. Stem pubescent, nearly simple, 2ft. to 3ft. high. Eastern Europe, 1780. (B. M. 2436.)

S. obtusa (obtuse-leaved). *fl.*, calyx tubular-campanulate, pubescent; corolla carmine, 1in. long, the tube inflated, twice as long as the calyx; whorls two-flowered, distant. Summer. *l.* petiolate, ovate, obtuse, 1in. long, cuneate at base, nearly glabrous above, cano-pubescent beneath. Stems bifarious, pubescent. *h.* 1½ft. Mexico, 1861. Greenhouse perennial. (F. d. S. 1412; R. G. 242, Fig. 1.)

S. odorata (sweet-scented). *fl.* shortly pedicellate; calyx campanulate, hairy-pubescent; corolla white, nearly thrice as long as the calyx, the upper lip falcate and compressed; whorls two-flowered, nearly 1in. distant; panicle 1ft. or more long, much-branched. July. *l.* petiolate, ovate-lanceolate, acuminate, irregularly crenate-toothed, cordate at base, 3in. long, wrinkled, white-tomentose; upper ones sessile; floral ones shorter than the pedicels, persistent. Branches ascending, the upper ones erect. *h.* 3ft. Bagdad, 1804. Greenhouse sub-shrub.

S. officinalis (officinal). Common Sage. *fl.*, calyx four to five lines long, campanulate, pubescent or villous; corolla purple, blue, or white, twice or thrice as long as the calyx; whorls few, ten to twenty-flowered, dense; racemes sub-simple. June. *l.* 1in. to 1½in. long, petiolate, entire, oblong, narrowed or rounded at base, wrinkled; lower ones white, tomentose or woolly below or on both sides; floral ones sessile, ovate, acuminate. Stem white-woolly; floriferous branches tomentose-pubescent. *h.* 1ft. South Europe, 1597. Hardy shrub. (B. M. Pl. 206.) For culture, &c., *see* **Sage.**

S. o. aurea (golden). A dwarf, compact form, with yellow flowers. It is very useful for ornamental bedding. 1879. Garden variety.

S. oppositiflora (opposite-flowered).* *fl.*, calyx tubular, with three acute teeth; corolla scarlet, four times as long as the calyx, pubescent outside, the tube long-exserted; whorls two-flowered, secund; racemes simple, 1in. long. June. *l.* petiolate, ovate,

Salvia—*continued.*

obtuse, 1in. to 1½in. long, rounded or cordate at base, wrinkled, pubescent; floral ones deciduous. Stem procumbent at base; branches erect, slenderly pubescent. *h.* 2ft. Peru, 1847. Half-hardy sub-shrub. (F. d. S. 345; P. M. B. xv. 53; R. G. 1855, 127.)

S. paniculata (panicled). *fl.* disposed in distant pairs, shortly stalked; calyx sub-campanulate, scabrid, two-lipped, ⅛in. long; corolla pale purplish-blue, four times as long as the calyx; tube short, wide; upper lip 1in. to 1½in. long, narrow sickle-shaped, obtuse. Summer. *l.* 1in. to 2in. long, leathery, obovate, acute or obtuse, irregularly toothed, scabrid on both surfaces, narrowed into a short stalk. *h.* 6ft. to 7ft. South Africa. Greenhouse shrub. (B. M. 6790.)

FIG. 411. FLOWERING BRANCH OF SALVIA PATENS.

S. patens (spreading).* *fl.*, calyx campanulate, six to seven lines long; corolla blue, upwards of 2in. long, the tube broad, the lips slightly gaping; whorls few, remote. September. *l.* petiolate, ovate-deltoid, crenate, hastate (or the upper ones rounded) at base, hispid; floral ones linear-lanceolate. Stem erect, pilose. *h.* 2½ft. Mexico, 1838. Half-hardy perennial. See Fig. 411. (B. iii. 109; B. M. 3808; B. R. 1839, 23; F. d. S. 503; P. M. B. vi. 1.) In some forms of this species, the leaves are all hastate, or the upper ones, or nearly all, rounded-cordate at base.

S. p. alba (white). A variety only differing from the type in having white flowers.

S. Pitcheri (Pitcher's). A synonym of *S. azurea grandiflora.*

S. porphyrantha (purple-flowered). A synonym of *S. Rœmeriana.*

S. porphyrata (purplish). A synonym of *S. Rœmeriana.*

S. pratensis (meadow-loving). *fl.*, calyx (as well as the small, ovate-cordate bracts) coloured; corolla bright blue, 1in. long, glabrous inside, the upper lip long and much arched, the lower broad; whorls about four-flowered, in spikes 1ft. to 1½ft. long. June to August. *l.* wrinkled, 3in. to 6in. long; radical ones oblong or ovate, long-petioled, obtuse, sometimes two-lobed at the base, with large, irregular crenatures; cauline ones few, similar or more oblong, smaller, on shorter petioles. *h.* 2ft. or more. Europe (Britain). (Sy. En. B. 1058; S. B. F. G. 26, under name of *S. Tenorii.*) Of this species, there are varieties with flesh-coloured, reddish, and white flowers.

Salvia—*continued.*

S. prunelloides (Prunella-like). *fl.* blue; corolla three times longer than the calyx, pubescent outside, the middle lobe of the lower lip emarginate; whorls remote, sub-secund; racemes simple, on long peduncles. August. *l.* petiolate, ovate-oblong, obtuse, crenate, narrowed at base, nearly glabrous. Stems erect, pilose-pubescent. *h.* 1ft. Mexico, 1838. (P. M. B. xi. 175.)

S. pulchella (pretty). *fl.*, calyx tubular, half or one-third as long as the corolla, slenderly pubescent; corolla scarlet, rarely exceeding 1in. in length, glabrous or pubescent outside, the tube ventricose; whorls about ten-flowered; racemes simple. December. *l.* petiolate, ovate, narrowed and slightly obtuse at apex, crenate, broadly cordate at base, slightly wrinkled, nearly glabrous; floral ones ovate, acuminate. Branches pubescent. *h.* 2ft. Mexico and Guatemala, 1821. Greenhouse shrub.

S. Regla (Regla). *fl.* nearly sessile; calyx coloured, tubular-inflated, with three short, ovate teeth; corolla scarlet, twice as long as the calyx, pubescent outside, the lips sub-equal; whorls terminal, few-flowered. July. *l.* petiolate, rounded-deltoid, obtuse, 1½in. long, sinuate-crenate, broadly sub-cordate at base, rufescent, wrinkled, slightly hispid above, pubescent on the nerves beneath. Branches purplish. *h.* 1½ft. Mexico, 1839. Hardy shrub. (B. R. 1841, 14.)

S. rhombifolia (rhomb-leaved). *fl.*, calyx often coloured, ovate, pubescent; corolla blue, half as long again as the calyx, the tube included; whorls about six-flowered, remote; racemes simple, few-flowered. All the year. *l.* numerous, petiolate, broadly ovate or rhomboid, 1½in. to 2in. long and broad, sub-cordate, pubescent; upper ones often sessile; floral ones ovate-lanceolate, deciduous, shorter than the calyx. Stem erect, branched, pubescent, 1ft. high. Peru, 1827. Stove annual. (B. R. 1429, under name of *S. foliosa.*)

S. ringens (gaping).* *fl.* reddish-purple; calyx striated; corolla four times as long as the calyx, the tube swollen, recurved-ascendent, the upper lip erect, sub-falcate, the lower large, with reflexed lobes; whorls about six-flowered, loose, remote. Summer. *l.* petiolate, irregularly pinnatisect; segments unequal, ovate-oblong, rounded at base, villous; floral ones deciduous. *h.* 1ft. to 2ft. Greece. Hardy shrub. (R. G. 59; S. F. G. 18.)

S. Rœmeriana (Rœmer's).* *fl.*, calyx somewhat pubescent, naked within; corolla deep scarlet, puberulent, 1in. or more long, narrowly tubular-infundibuliform, somewhat arcuate; racemes loose and elongated. July. *l.*, or terminal leaflet, roundish or cordate-reniform, coarsely repand-toothed or crenately incised; lower ones with two or three similar or smaller lateral leaflets, occasionally reduced to tooth-like appendages; floral leaves mostly shorter than the pedicels. Stems 1ft. to 2ft. high, often sparsely hairy below. Texas, 1852. SYNS. *S. porphyrantha* (F. d. S. 1080; R. H. 1854, 16), *S. porphyrata* (B. M. 4939).

S. Rœzlii (Roezl's). *fl.*, calyx pale green, stained with red towards the apex, inflated; corolla bright scarlet, puberulous, having two prominent, spreading lips. Summer. *l.* smooth, ovate-oblong, crenately toothed. *h.* 1½ft. Mexico, 1861. A rather showy, greenhouse under-shrub. (F. d. S. 1407.)

S. rubescens (reddish). *fl.*, calyx purple-brown, densely glandular-hairy; corolla scarlet, 1in. long (twice as long as the calyx), the tube slightly ascending; whorls rather distant, four to eight-flowered; panicle 1ft. or more long, ebracteate. Summer. *l.* variable in size, 4in. to 10in. long, long-petiolate, ovate-cordate, crenate, acute or acuminate, puberulous above, hoary beneath. Stems four-angled. *h.* 1½ft. Columbia, 1872. Stove shrub. (B. M. 5947.)

S. rutilans (glowing-red).* Pineapple-scented Sage. *fl.* disposed in spike-like racemes, forming leafy panicles; corolla of a bright scarlet colour, having a slender tube and a deflexed lower lip. Summer. *l.* cordate-ovate, acuminate, soft, downy. *h.* 2ft. to 3ft. Origin uncertain, 1873. Greenhouse sub-shrub. (G. C. n. s., xv. p. 117; R. H. 1873, 251.)

S. scabiosæfolia (Scabious-leaved). *fl.* pretty; calyx ample, campanulate, villous; corolla whitish, twice as long as the calyx, the upper lip bifid; whorls six to ten-flowered, distinct; racemes 4in. to 6in. or more long, simple. August. *l.* numerous, pinnatisect; segments three to five-jugate, often ternate or twin, entire, bisected, or pinnatisect, oblong or linear, acute. Stems diffuse, 1ft. to 1½ft. long. Branches diffuse, woolly-pilose. Tauria, 1818. (B. M. 5209; B. M. 1429, under name of *S. Hablitziana.*)

S. Schimperi (Schimper's). *fl.*, calyx tubular-campanulate, the upper lip three-toothed, the lower one bifid; corolla white, twice as long as the calyx; panicle twiggy-branched. Summer. *l.* ample, ovate-lanceolate, acute, crenulate, rounded-cuneate at base, wrinkled, white-woolly on both sides, snowy beneath; floral ones very broad, equalling the calyx, scabrous-ciliated, whitish beneath. Stem thick, pubescent or slightly woolly at base. *h.* 3ft. Abyssinia, 1875. Half-hardy sub-shrub. (B. M. 6300.)

S. Sclarea (Sclarea).* Clary. *fl.*, calyx whitish at base, campanulate, pubescent-hispid; corolla bluish-white, twice as long as the calyx, the tube contracted, the upper lip falcate and compressed; whorls distant, about six-flowered; racemes paniculate. August. *l.* petiolate, ample, often 8in. to 9in. long, ovate, erose-crenate, cordate at base, wrinkled, hoary (more glabrous under cultivation); uppermost ones amplexicaul; floral ones coloured, very

Salvia—*continued.*

broad, acuminate, concave. Stem erect, 2ft. to 3ft. high, viscous, villous. South Europe, 1562. (S. F. G. 25; B. M. 2320, under name of *S. bracteata*; B. R. 1003, under name of *S. Simsiana.*)

S. splendens (splendid).* *fl.*, calyx coloured, campanulate, with three broadly ovate teeth; corolla scarlet, 2in. to 2½in. long, glabrous, the tube exserted and slightly enlarged, the lower lip shortened; whorls two-flowered. December. *l.* petiolate, ovate, acuminate, crenate-serrate, cuneate, rounded, or sub-cordate at base, glabrous; floral ones ovate, acuminate, coloured, deciduous. Branches glabrous. *h.* 3ft. Brazil, 1822. A very pretty, greenhouse shrub. (B. R. 687; L. B. C. 1089; I. H. 1881, 432, under name of *S. brasiliensis.*) SYN. *S. colorans* (of gardens).

S. s. Bruantii (Bruant's).* *fl.* of a brighter scarlet than in the type. Habit dwarfer. 1881. A handsome garden variety. (F. M. 447; G. C. n. s., xiv. p. 781.)

S. strictiflora (erect-flowered). *fl.*, calyx tubular, pubescent; corolla golden-scarlet, 1½in. long, the tube elongated and incurved, the lip sub-equal, scarcely spreading; whorls two-flowered, secund; racemes upwards of 1ft. long. December. *l.* petiolate, ovate, acute, 1½in. to 2in. long, pale green, crenate-serrate, cordate at base, rather thick, slightly fleshy, nearly glabrous; floral ones glume-like, deciduous. Branches shortly tomentose-pubescent. *h.* 2ft. Peru, 1831. Stove shrub. (B. M. 3135; P. M. B. 247.)

S. taraxacifolia (Dandelion-leaved). *fl.* very shortly pedicellate; calyx ¼in. long, the lobes subulate-aristate; corolla pale pink, with a yellowish disk to the lower lip, and a purple-speckled, pilose palate; whorls six to ten-flowered. July. *l.* 2in. to 4in long, pinnatisect, sessile or petiolate; lower lobes few or many; terminal one 1in. to 1½in. long, ovate, obtuse or cuspidate, irregularly sinuate-toothed; all snowy-tomentose beneath; floral ones sessile, ovate-aristate. Stems numerous, ascending, at length erect, 6in. to 18in. high. Great Atlas, 1872. (B. M. 5991.)

S. tricolor (three-coloured). *fl.* racemose, solitary, opposite; calyx oblong-campanulate, deeply costate; corolla white, the lower part of the large lower lip reddish, deflexed, trilobed. July. *l.* small, shortly petiolate, ovate, rounded-obtuse at apex with a terminal tooth, the base attenuated, sub-decurrent, the margins crenulate. *h.* 2ft. Mexico. Half-hardy shrub. (F. d. S. 1237; I. H. 1856, 120.)

S. tubifera (tube-bearing). *fl.* sub-sessile; calyx tubular, with three acuminate teeth; corolla purple-red, 1in. to 1¼in. long, glabrous or pubescent, the tube long-exserted, equal, and slightly incurved; whorls usually four or five-flowered, secund; racemes 6in. long, simple. August. *l.* petiolate, broadly ovate, crenate-serrate, rounded-truncate or nearly cuneate at base, almost glabrous, or cano-pubescent beneath. Stem 2ft. or more long, erect or ascending, acutely tetragonal, purplish. Mexico, 1824. Greenhouse perennial herb or under-shrub. (B. R. 1841, 44.)

S. Verbenaca (Vervain-like). Vervain Sage; Wild Clary, &c. *fl.*, calyx campanulate, the upper lip having minute, spinescent teeth; corolla blue-purple, ¼in. long, the upper lip short and compressed; whorls six-flowered, in long, bracteate spikes. June to September. *l.* 2in. to 4in. long, wrinkled; radical ones petioled, oblong, obtuse, irregularly crenate or serrate; upper cauline ones sessile, oblong or deltoid-ovate. Stem leafy, erect, 1ft. to 2ft. high. Europe (Britain). Hardy perennial. (Sy. En. B. 1056.)

S. V. clandestina (clandestine). *fl.*, upper calyx teeth less spiny than in the species; corolla more purple, longer, the upper lip longer arched. *l.* narrower. Jersey and Guernsey. Plant smaller and more slender than the type. (S. F. G. 24; Sy. En. B. 1057.)

SALVINIA (named in honour of Antonio Maria Salvini, a Professor at Florence in the seventeenth century). ORD. *Salvinieæ.* A small genus (all the supposed species are reducible to one) of plants found floating on still water (like *Lemna*), broadly dispersed over the Northern hemisphere, and in tropical and South America. "This pretty little floating aquatic, which, like *Azolla*, is suitable for a stove, greenhouse, or indoor aquarium, is easily managed in the summer time, simply requiring to be let alone or have its water changed, if necessary; but in the winter is often lost through a want of knowledge of its life-history. The mature plant floats on the water, and has no true roots, though the row of divided leaves on the under side of the stem look like roots at first sight, and assume their functions. Among these the spore capsules are developed, and from them the plant must be grown annually, as the old plants die in the winter. The best way to preserve the spores is to half fill a broad pan with sandy loam, and then fill up with water; when the water has cleared, place a number of plants upon it, and stand the pan by in a cool greenhouse. In

Salvinia—*continued.*

the winter, the plants will all die, but the spores will remain in the loam, which must not be thrown away or allowed to dry, and the next spring they will reproduce the plant" (N. E. Brown).

S. natans (floating). *fr.* consisting of globular bags, composed of a double membrane, at length bursting irregularly. *l.* Fern-like, sub-elliptic, entire, floating, not curled up when young. Rhizome floating, thread-like, leafy above, and furnished below with long rootlets and fruit on short, leafless branches. The young plant closely resembles a young Selaginella, apart from the two cotyledon-like processes.

SALVINIEÆ. A small natural order of annual, floating herbs, not attached to the soil, resembling large Lemnæ (*Salvinia*) or a Jungermannia (*Azolla*), with no true stem. *Salvinia* is met with throughout the Northern hemisphere, as well as in tropical and South America; and *Azolla*, the only other genus, inhabits Asia, Africa, Australia, and America from Canada to the Straits of Magellan. Fronds with margins reflexed before expansion, usually claret-coloured on the under surface, sometimes composed of cellular tissue, without nerves and stomata (*Salvinia*); sometimes with a stomatiferous epidermis (*Azolla*), rounded or lobed, sessile or sub-sessile, alternate or distichous, imbricated. Reproductive organs of two kinds, similar to those of *Marsileaceæ*, inserted at the base of the fronds. The order embraces about eighteen species.

SAMARA (of Swartz). A synonym of **Myrsine** (which *see*).

SAMARA. An indehiscent fruit, producing a wing from its back or end; *e.g.*, the fruit of the Maple.

SAMAROID. Resembling a Samara.

SAMBUCUS (the old Latin name used by Pliny, and derived from *sambuke*, an ancient musical instrument, supposed to have been made of Elder-wood). Elder. SYN. *Tripetelus.* ORD. *Caprifoliaceæ.* A genus comprising ten or twelve species of mostly hardy trees, sub-shrubs, or shrubs, rarely perennial herbs; they are dispersed over all temperate regions (South Africa excepted) and tropical mountains. Flowers white, yellow, or pinkish, small, with articulated pedicels, disposed in umbelliform corymbs or dense-flowered thyrses; calyx tube ovoid or turbinate, the limb equally three to five-lobed or toothed; corolla rotate or rotate-campanulate, equally three to five-parted, the lobes imbricated or rarely valvate; stamens five. Drupes baccate, containing three to five one-seeded stones. Leaves opposite, imparipinnate; leaflets serrated or laciniated, naked at base, glandular or augmented by a stipuliform leaflet. Branches rather thick. Two species, *S. Ebulus* and *S. nigra*, are indigenous to Britain. The berries of the latter are largely employed in the manufacture of Elderberry wine. Various kinds of medicine, cosmetics, &c., are obtainable from several of the species. Speaking of the common Elder, Evelyn remarks: "If the medicinal properties of the leaves, bark, berries, &c., were thoroughly known, I cannot tell what our countryman could ail for which he might not fetch a remedy from every hedge, either for sickness or wound." The species in cultivation are described below. They are all hardy, and are of very simple culture, thriving in almost any soil or situation. Propagation may be effected, in the case of the herbaceous species, by division; the shrubby kinds increase readily from cuttings. The common Elder fruits abundantly, if the soil be kept somewhat moist; its position should be an open one, fully exposed to light and air. A plantation or hedge may be readily formed by cuttings of this species, where the soil is tolerably moist. The Golden Elder (*S. nigra aurea*) is a fine ornamental plant for shrubberies, or for use in sub-tropical gardening. If the young shoots are regularly pinched at their points, the plants may be kept dwarf and of a fine golden colour all the summer.

Sambucus—*continued.*

S. canadensis (Canadian). *fl.* white, almost scentless; cymes of five main branches. July and August. *fr.* deep bluish-black. *l.* pinnate or sub-pinnate; leaflets about nine, oblong, oval, stiffish, acuminate, more or less pubescent beneath, sometimes appendiculated at the base. *h.* 4ft. to 6ft. Canada to Carolina, 1761. Shrub. (B. M. Pl. 138.)

S. Ebulus (Ebulus). Dane's Blood; Dane Weed; Danewort; Deadwort; Dwarf Elder, &c. *fl.* white, tipped with pink, broadly campanulate; cymes 3in. to 4in. in diameter, three-rayed, corymbose, compact. July and August. *fr.* black, small, globose. *l.*, leaflets four to six pairs, oblong-lanceolate, 4in. to 6in. long, serrated; stipules leafy, serrated. Stems 2ft. to 4ft. high, many, stout, ribbed and grooved. Europe (Britain), North Africa. Herbaceous perennial. (Sy. En. B. 638.)

FIG. 412. PORTION OF INFLORESCENCE OF SAMBUCUS NIGRA.

S. nigra (black).* Boon-tree; Bur-tree; Common Elder. *fl.* white, rotate, ¼in. in diameter; cymes 4in. to 6in. in diameter, flat-topped, five-rayed. June. *fr.* black, rarely green, small, globose. *l.*, leaflets two to four pairs, 1in. to 3in. long, ovate, oblong, or lanceolate, rarely orbicular, serrated; stipules small or absent. Trunk often as thick as the thigh; branchlets angular. *h.* 25ft. Europe (Britain), North Africa. Tree. See Fig. 412. (B. M. Pl. 137; Sy. En. B. 637.)

S. n. aurea (golden).* Golden Elder. A fine variety, with golden leaves.

S. n. laciniata (torn).* Parsley-leaved Elder. *l.*, leaflets cut into fine segments. A handsome form.

S. n. monstrosa (monstrous). *fl.* five to fifteen-parted; stigmas five to twelve. *fr.* irregular. Branches striped.

S. n. rotundifolia (round-leaved). *fl.* in few-flowered corymbs. *l.* trifoliolate; leaflets petiolate, roundish, serrated.

Other forms of *S. nigra* are: *foliis argenteis* and *foliis luteis*, leaves variegated with white and yellow respectively; *leucocarpa*, fruit white; *virescens* fruit yellowish-green.

S. pubens (downy). *fl.* whitish, in a thyrsoid panicle. April and May. *fr.* red. *l.* pinnate; leaflets five, membranous, ovate-lanceolate or oblong, acuminated, serrated, pubescent, but chiefly on the under side. *h.* 6ft. to 12ft. North America, 1812. A large shrub or low tree.

S. racemosa (racemose-flowered).* Hart's Elder; Scarlet-berried Elder. *fl.* white; panicle ovate. April and May. *fr.* scarlet. *l.* pinnate, pale green, large, rather smooth; leaflets five, membranous, oblong, acuminated, serrated, unequal at the base; petioles glabrous. *h.* 10ft. to 20ft. South Europe and Siberia, 1596. A low tree or large shrub. (F. D. 2951.) The form *laciniata* has jagged leaflets. *plumosa* has deeply pinnatifid leaflets.

SAMBUL PLANT. A common name for *Ferula Sumbul.*

SAMOLUS (an old name which Pliny ascribes to the Druids, and which is thought by Sprengel to refer to *S. Valerandi*). Brook-weed. ORD. *Primulaceæ.* A genus comprising about eight species of greenhouse or hardy herbs, sometimes shrubby at base. *S. Valerandi* is cosmopolitan, growing wild in Britain, and the rest are mostly found on the seashores of extra-tropical Southern regions. Flowers white, in terminal racemes or corymbs; calyx one-half superior, the limb five-fid; corolla perigynous, nearly campanulate, five-parted; stamens five. Leaves alternate, the lower ones sometimes rosulate, linear, oblong, or spathulate, entire. The species have no great ornamental value. One only calls

Samolus—*continued.*

for description here. It thrives freely in ordinary soil, in a moist position; and may be increased by division.

S. repens (creeping). *fl.* pinkish-white, usually four to five lines across; corolla tube broad, as long as the ovate lobes. August. *l.*, radical ones petiolate, ovate or oblong; cauline ones usually small, linear or oblong. Stems simple or branched, prostrate or erect, and 6in. to 12in. high. Australia, 1806. Hardy perennial. (L. B. C. 435, under name of *S. littoralis.*)

SAMPHIRE (*Crithmum maritimum*). A native, hardy perennial, which grows naturally near the sea-coast, and is not very easily cultivated inland. The leaves are occasionally used in salads, and for seasoning. It requires, under cultivation, a warm position at the foot of a south wall, and an occasional dressing of sea-salt; protection must also be provided in winter. Propagation is effected by divisions or by seeds; the latter should be sown soon after they are ripe, in autumn.

SAMYDA (from *Samydo*, the old Greek name used by Theophrastus for the Birch; in allusion to the resemblance in habit). ORD. *Samydaceæ.* A small genus (two species) of stove, evergreen shrubs, natives of the West Indies. Flowers white, pink, or greenish, rather large, solitary or fascicled; calyx tube campanulate, coloured; lobes four to six, imbricated, unequal; petals absent; stamens eight to thirteen, the filaments connate in a tube. Leaves distichous, alternate, oblong, pellucid-dotted; stipules minute. The species are ornamental subjects; they thrive in a mixture of loam and peat. Propagated readily by cuttings, inserted in a pot of sand, under a hand glass, in slight heat.

S. glabrata (glabrous). *fl.* greenish-white, solitary or a few in the axil, sub-sessile or shortly stalked, campanulate, about ⅛in. long. July and August. *l.* oblong, entire or obsoletely serrulated, glabrous, 3in. to 5in. long; pellucid dots and lines distant. Branchlets pubescent. *h.* 5ft. to 12ft. 1800. SYN. *S. spinulosa.*

S. serrulata (serrulated). *fl.* white or red, ⅛in. or more long, solitary or fascicled, campanulate, pubescent; calyx lobes blunt. July. *l.* soft, oblong or elliptic, serrated, pointed or blunt, 2in. to 4in. long, pubescent or glabrous above, velvety beneath. *h.* 4ft. 1723. (B. M. 550, under name of *S. rosea.*)

S. spinulosa (slightly spiny). A synonym of *S. glabrata.*

SAMYDACEÆ. A natural order of glabrous, pubescent, or tomentose trees or shrubs, broadly dispersed over tropical regions. Flowers regular, usually hermaphrodite, inconspicuous, racemed, fascicled, or panicled; calyx coriaceous, persistent, the tube usually free, the limb of three to seven imbricate or valvate lobes; petals as many as the calyx lobes, and similar, rarely more or wanting, imbricate in bud; stamens definite or indefinite, in one or many series, usually alternating with staminodes, equidistant or collected in fascicles; filaments filiform or capillary, free or connate; anthers didymous or oblong; pedicels articulated and bibracteolate. Fruit indehiscent or capsular, one-celled, one or many-seeded, three to five-valved at the top and throughout its length. Leaves petiolate, simple, alternate and distichous, rarely opposite or whorled, sometimes pellucid-dotted, entire or serrated, the teeth sometimes gland-tipped; stipules small, usually deciduous, or absent, rarely leafy. The order comprises seventeen genera, and about 150 species. Examples: *Abatia, Banara, Cascaria, Homalium,* and *Samyda.*

SANCHEZIA (named in honour of Josef Sanchez, Professor of Botany at Cadiz). SYN. *Ancylogyne.* ORD. *Acanthaceæ.* A noble genus of stove, erect, perennial herbs or sub-shrubs, glabrous or loosely pilose above; there are about eight species, natives of Peru, Columbia, and Brazil. Flowers orange, reddish, or purple, sessile in the axils of the bracts, or shortly pedicellate and fascicled or rarely solitary; calyx deeply five-fid or five-parted; corolla tube long, cylindrical or slightly swollen above the middle, limb of five rounded, spreading lobes; bracts sometimes ample, in a cup-like fascicle, sometimes narrow or small; bracteoles resembling calyx segments. Leaves opposite, ample, entire or scarcely toothed. Two species

Sanchezia—*continued.*

have been introduced. They require culture similar to **Barleria** (which *see*).

S. longiflora (long-flowered).* *fl.* about 2in. long, tubular, and, together with the calyces, pedicels, and branches of the panicle, of a rich vinous-purple colour, disposed on drooping, elongated branched panicles. April. *l.* ample, ovate-oblong or obovate-lanceolate. Stems four-angled. Guayaquil, 1866. A handsome perennial, of shrubby habit. (F. d. S. 2460; B. M. 5588, under name of *Ancylogyne longiflora.*)

S. nobilis (noble).* *fl.*, corolla yellow, 2in. long, cylindrical, slightly curved; bracts bright red, 1in. to 1½in. long, each pair inclosing eight to ten flowers; inflorescence erect, terminal, consisting of numerous opposite fascicles, forming a dense panicle, with deep purple branches. June. *l.* 3in. to 9in. long, oblong-obovate or oblong-lanceolate, acuminate, obtusely toothed, narrowed into short, broad-winged petioles which are connate at base. *h.* 1ft. to 3ft. Ecuador, 1866. Sub-shrub. (B. M. 5694; F. d. S. 2437.)

FIG. 413. SANCHEZIA NOBILIS GLAUCOPHYLLA.

S. n. glaucophylla (glaucous-leaved).* A variety having leaves of a glaucous-green, striped with white or yellow. See Fig. 413. (I. H. 580.) SYN. *S. n. variegata.*

S. n. variegata (variegated). A synonym of *S. n. glaucophylla.*

SAND. The use and value of Sand for plant-propagation, and for intermixing with composts, &c., generally, are known to nearly every gardener. Sand tends to insure porosity, by keeping composts open, and, when laid over the surface of pans or pots prepared for cuttings, settles more closely, on being watered, than does soil, and so holds the cuttings firm, and excludes air. Numerous sorts of cuttings are rooted best in Sand alone, as this substance contains nothing which can decompose, and prevent the formation of roots. While there is an advantage in this, Sand, on the other hand, contains in itself nothing nutritive for supporting plants; they must therefore be potted in soil, according as each may require, soon after roots are formed. Water is sufficient for supplying all that tender little rootlets need for a time, until the plants are sufficiently strong to be potted. Silver Sand is best, and is that most extensively used: the coarser it is, the better. Sand from the sea-coast is by some gardeners largely employed for propagating. Road Sand is invaluable for mixing in composts, especially those for growing such plants as Carnations; it is usually coarse and sharp, from being washed by heavy rains. Although Sand is so generally used in composts, yet its place may be taken with advantage by charcoal or charred soil, hen either is procurable. Charcoal is of an enduring nature, and possesses the property of absorbing gases, which Sand does not; it also acts most effectually in keeping a compost open. Sand is valuable

Sand—*continued.*

for placing around tender bulbs when planting, to preserve them from injury by being in contact with decomposing substances in the soil, and to provide a ready means of escape for any undue accumulation of water.

SANDAL-TREE. *See* **Sandoricum.**

SANDAL WOOD. The wood of *Santalum album.*

SANDARACH GUM-TREE. A common name for *Callitris quadrivalvis.*

SANDBOX TREE. *See* **Hura.**

SANDERSONIA (named in honour of John Sanderson, Honorary Secretary of the Horticultural Society of Natal). ORD. *Liliaceæ.* A monotypic genus. The species is a pretty, tuberous-rooted, erect-growing herb, with simple, leafy stems. For culture, *see* **Gloriosa.**

S. aurantiaca (orange-coloured).* *fl.* orange-coloured, showy, nodding, on axillary, solitary, ebracteate pedicels; perianth persistent, urceolate-globose, slightly inflated, with a short, six-cleft mouth, and having six short horns or spurs forming nectariferous cavities at the base; stamens six, hypogynous, much shorter than the perianth. *l.* lanceolate, with a sometimes cirrhose acumen; upper cauline and floral ones similar, or the uppermost ones smaller. *h.* 1½ft. Natal, 1852. (B. M. 4716.)

SAND LEEK. A common name for *Allium Scorodoprasum.*

SAND MYRTLE. *See* **Leiophyllum.**

SANDORICUM (altered from *Santoor*, the Malay name of the genus). Sandal-tree. ORD. *Meliaceæ.* A genus of about four species of stove, evergreen, glabrous or pubescent-tomentose trees, natives of the Moluccas. Flowers yellow, sparse or glomerate, bracteate; calyx cup-like, the limb of five short, imbricated lobes; petals five, free, imbricated; panicles axillary. Fruit apple-shaped, fleshy, acid, edible. Leaves trifoliolate; leaflets ample, nerved. *S. indicum* is extensively cultivated in the tropics. It thrives in a compost of loam and peat. Propagation may be effected by cuttings, inserted in sand, under a hand glass, in heat.

S. indicum (Indian). *fl.* disposed in axillary, somewhat panicled racemes. *fr.* agreeably acid, containing five ovate-compressed nuts. *l.*, leaflets ovate-oblong, entire, pubescent. Lofty tree. 1820. (B. F. S. 319.)

SAND VERBENA. *See* **Abronia.**

SANDWORT. *See* **Arenaria.**

FIG. 414. SANGUINARIA CANADENSIS (page 356).

SANDY PEAR. *See* **Pyrus sinensis.**

SANGUINAIRE PLANT. A common name for *Paronychia argentea.*

SANGUINARIA (from *sanguis*, blood; the rootstock of the plant is surcharged with a reddish-orange, acrid juice). Blood-root; Red Puccoon. ORD. *Papaveraceæ.* A monotypic genus. The species is a low, hardy, perennial herb, with a thick, prostrate rootstock. It proves useful for ornamenting the front of flower borders. A light, sandy loam or peat soil is suitable. Increased by division of the roots, or by seeds.

S. canadensis (Canadian).* Common Bloodroot; Bloodwort. *fl.* white, handsome; sepals two; petals eight to twelve, in two or three series, not crumpled; stamens numerous; scape naked, one-flowered. April and May. *l.* solitary, rounded, palmately veined. *h.* 6in. North America, 1680. See Fig. 414. (B. M. 162.)

SANGUINE, SANGUINEOUS. Dull red, passing into brownish-black.

SANGUISORBA. Included under *Poterium.*

SANGUISORBACEÆ. Included under *Rosaceæ.*

SANHILARIA. A synonym of **Stifftia** (which *see*).

SANICLE, BEAR'S EAR. *See* **Cortusa.**

SANSEVIELLA. A synonym of **Reineckea** (which *see*).

SANSEVIERA (named after Raimond de Sansgrio, Prince of Sanseviero, 1710-1776). Bowstring Hemp. SYNS. *Acyntha, Salmia.* ORD. *Hæmodoraceæ.* Nine species are enumerated by Mr. Baker as belonging to this genus; they are stove, herbaceous perennials, with short, thick, sometimes stoloniferous rhizomes, natives of tropical and South Africa and the East Indies. Flowers mediocre or long, racemose; perianth tube sometimes very long, scarcely enlarged at apex, the lobes narrow, equal, and slightly spreading; stamens six; pedicels articulated at apex; scape simple, tall. Leaves rosulate, thick, cartilaginous, fibrous within, often elongated, nearly flat or terete. The four best-known species are described below. They are interesting plants, thriving in sandy loam. Propagation may be effected by suckers. When dormant, the plants should be sparingly watered.

S. cylindrica (cylindrical). *fl.*, perianth whitish, 1in. to 1½in. long, the segments equalling the very slender tube; anthers at length exserted; raceme 2ft. to 2½ft. long, 2½in. to 3in. thick when expanded; scape nearly 1ft. high, firm. August. *l.* arcuate, cylindrical, 5ft. to 4ft. long, 1in. thick, rigid, coriaceous. South tropical Africa, 1856. (B. M. 5093.)

S. guineensis (Guinea). *fl.*, perianth whitish, tinged with greenish-brown, 2in. long, the segments equalling the tube; raceme simple, 1½ft. to 2ft. long, 3in. broad when expanded; scape 1ft. to 1½ft. high, glaucous, purplish-green, with three or four deltoid bracts. September. *l.* sub-erect, oblanceolate, cartilaginous, 3ft. to 4ft. high, 2½in. to 5in. broad above the middle, whitish or obscurely reddish on the margins, white-spotted, cuspidate. Guinea, 1690. (B. M. 1179.) *S. glauca, S. lactevirens,* and *S. polyphylla,* are mere forms of this species.

S. longiflora (long-flowered). *fl.*, perianth greenish-white, 3½in. to 4in. long, at length drooping, the segments one-third the length of the tube; raceme dense, 1ft. to 1½ft. long, 8in. to 9in. thick; scape 1ft. or more long. July. *l.* sub-erect, oblanceolate, 1ft. to 2ft. long, 3in. to 4in. broad, white-spotted, distinctly red-margined, cartilaginous, but not thick. Tropical Western Africa, 1824. (B. M. 2634.)

S. zeylanica (Cingalese). *fl.*, perianth greenish-white, 1¼in. to 1½in. long, the segments equalling the tube; raceme 1ft. or more long, 2in. to 2½in. thick; scape 1ft. or more high. September. *l.* falcate, 1ft. to 2ft. or more long, ensiform, sub-terete, ⅔in. to 1in. broad at base, deeply channel-ed, obscure green with white markings, the margins scarious and distinctly red-lined. East Indies, 1731. (B. R. 160.) *S. ensifolia, S. grandicuspis, S. pumila,* and *S. stenophylla,* are mere garden forms of this species.

SANTALACEÆ. A natural order of trees, shrubs, or dwarf herbs, a few of which are parasitic on trees or roots; they are broadly dispersed over tropical and temperate regions. Flowers greenish, yellowish-green, or rarely orange, usually small, but in a few instances conspicuous, hermaphrodite or dicœcious, or rarely moncœcious by abortion, regular; perianth simple, green

Santalaceæ—*continued.*

or corolla-like, sometimes slightly fleshy, adnate to the disk or to the base of the ovary, four, five, or rarely three or six-lobed, valvate or rarely loosely imbricated; stamens (except in *Grubbia*) as many as the perianth lobes; filaments filiform or rather broad, sometimes very short; style cylindrical, conical or shortened; bracteoles usually two; inflorescence variable. Fruit indehiscent, nut-like or often drupaceous. Leaves alternate or opposite, entire, sometimes scale-like; stipules none. The order comprises twenty-eight genera, and nearly 220 species. Illustrative genera are: *Exocarpus, Grubbia, Santalum* and *Thesium.*

SANTALUM (from the Persian *Chandal*, which, in turn, is derived from the Sanscrit *Chandana*, the name of the tree). SYN. *Sirium.* ORD. *Santalaceæ.* A genus embracing about eight species of stove, evergreen, glabrous trees or shrubs, closely related, natives of the East Indies, the Malayan Archipelago, Australia, and the Pacific Islands. Flowers often larger than in allied genera, in small, axillary or terminal, trichotomous panicles, usually shorter than the leaves, and sometimes almost reduced to simple racemes; perianth tube campanulate or obovate, the lobes four, or rarely five, with a tuft of hairs inside behind each stamen. Leaves opposite or rarely alternate, petiolate, entire, coriaceous or slightly fleshy, penniveined, but the midrib only conspicuous. Two of the species have been introduced, one of which (*S. album*) yields the Sandal Wood of India. The cultivation of this plant in gardens is not easy. It is supposed to be more or less parasitical on the roots of other plants which grow near it. In India it is extensively grown, but it thrives only under peculiar conditions. Some authorities deny that it is at all parasitical. At Kew, young plants of *S. album* are inserted in very sandy loam, and grown in a stove temperature. The other introduced species will thrive under similar conditions.

S. album (white). *fl.* reddish within, campanulate, four-fid; pedicels nearly equalling the perianth tube; panicles terminal and lateral, many-flowered. May. *l.* ovate-elliptic, acute at base, acute or rarely obtuse at apex, 1½in. to 2½in. long, sometimes varying on the same branch from ovate to ovate-lanceolate, pale beneath, membranous. *h.* 15ft. East Indies, 1804. Tree. The wood is white or citron-coloured and sweet-scented when dry, and it is much esteemed in India as a perfume. (B. M. 3235.)

S. a. myrtifolium (Myrtle-leaved). *l.* narrower and paler beneath than in the type. Shrub or small tree.

S. obtusifolium (obtuse-leaved). *fl.* red, few, in small, shortly pedunculate, axillary racemes or cymes, the short pedicels or lateral branches rarely bearing two or three flowers. June. *l.* opposite, or the uppermost ones rarely alternate, linear-oblong, lanceolate, or broadly oblong, obtuse, 1in. to 2in. long, rather thick, the margins often revolute when drying. *h.* 6ft. Australia, 1823. A slender shrub, of livid aspect.

SANTOLINA (probably from *Santonica*, an old name given by Pliny to a kind of Wormwood, found among the Santones, a Gallic tribe). Lavender Cotton. ORD. *Compositæ.* A genus consisting of about eight species of sweet-smelling, mostly hardy sub-shrubs, inhabiting the Mediterranean regions. Flower-heads yellow (or whitish?), mediocre or small, long-pedunculate; involucre ovoid, sub-globose, or scarcely hemispherical; the bracts many-seriate, appressedly imbricated; receptacle slightly convex; florets regular; achenes glabrous, three, four, or rarely five-jointed. Leaves alternate, pectinate, or clustered and pinnatisect. A selection from the species introduced is given below. *S. Chamæcyparissus* has long been known in gardens. For culture, *see* **Achillea.**

S. Chamæcyparissus (Chamæcyparis-like). Common Lavender Cotton. *fl.-heads* resembling those of a Chamomile divested of its white rays, solitary at the ends of the wiry twigs. July. *l.* small, linear, thickly set on the twigs, furnished with four to six rows of short, obtuse teeth, and, as well as the stems, clothed with hoary pubescence. *h.* 1ft. to 2ft. South Europe, 1573.

S. C. incana (hoary).* A pretty, dwarf-growing plant, useful for divisional lines or edging; its slender, twig-like growths and knotty leaves are densely covered with silvery tomentum.

Santolina—*continued.*

S. C. squarrosa (squarrose). *fl.-heads* smaller than peas. *l.* slightly hoary. Stem erect.

S. C. tomentosa (tomentose). *fl.-heads* larger than peas; involucre somewhat mealy.

S. rosmarinifolia (Rosemary-leaved). *fl.-heads* globose or hemispherical; involucral scales highly glabrous, sub-carinate, acute. August. *l.* linear, slightly acute; lower ones tubercled on the margins; upper ones flat, entire or slightly denticulate at apex. Branches straight, erect, one-headed. *h.* 2ft. South Europe, 1683. (S. E. B. 62.)

SANVITALIA (so-called after the Sanvitali family, of Parma). SYN. *Lorentea.* ORD. *Compositæ.* A small genus (three or four species) of stove or half-hardy, annual or perennial herbs, inhabiting the Mexican region. Flower-heads yellow or whitish, rather small or mediocre, the disk often purplish; ray florets one or two-seriate; involucral bracts in two or three series: receptacle flat or convex; achenes glabrous, those of the ray having three arms. Leaves all opposite, entire. *S. procumbens* is in cultivation. It is a half-hardy, much-branched trailer, thriving in a mixture of light, sandy loam and peat, and may be increased by seeds.

S. procumbens (procumbent). *fl.-heads* small, like those of a species of *Rudbeckia*, having a bright yellow ray and a dark disk; outer achenes of the disk muricated. July. *l.* ovate, entire. Stem procumbent or diffuse. 1798. (B. R. 707.) There is also a double-flowered variety.

SAP. The fluid that exists in living plants, for the most part inclosed in the cells of which they are built up. It varies much in composition in different parts of the same plant; and the nature of these variations must be explained. A plant growing in the soil pushes out roots and rootlets, and through them sucks in, from the damp earth, a large amount of water. This passes into the hairs of the root by gradual absorption, carrying with it some mineral compounds, such as common salt, phosphates, &c., in solution. These mineral substances are present in only very small proportions in the solutions; but, in course of time, a considerable quantity thus enters the plant, if the substances occur in the soil in forms suitable for absorption by plants. The water, with its dissolved mineral substances passes from the root-hairs into the root, and thence into the stem, remaining little changed in composition, and bearing the name of *Crude Sap.* This crude Sap flows upwards in the younger (*i.e.*, outer) layers of wood of the stem, and in some plants it is possible to tap the stream, and to obtain nearly pure, and quite drinkable, water, when a hole is bored deep enough to reach the young layers of wood. The crude Sap is conveyed to the green parts of the plant; and there, especially in the leaves, it undergoes great changes. A quantity of the water is given off from the leaves by evaporation or transpiration, rendering the solutions denser in the leaves than in the stems. But the great change brought about in the Sap in the green parts of plants consists in the formation in these parts of various substances, of which the most easily detected is *starch.* This is present in solid grains in the cells containing the green substance or chlorophyll, when the green parts have been exposed for an hour to the action of daylight or to strong artificial light. Several substances, that in composition resemble starch to some extent, are formed in the cells containing chlorophyll, and some of them remain in solution in the cell Sap, while others assume a solid form. Other substances, resembling protoplasm in general composition, are also formed in the green parts of plants, and probably also in other parts; and these, too, are often dissolved in the Sap. Owing to the loss of water by evaporation, and to the addition of these new organic products, the Sap becomes "elaborated," being heavier and thicker than the crude Sap. It passes from the parts in which it was elaborated to all parts where nourishment is required, whether to supply the material consumed during

Sap—*continued.*

growth, or to allow of the formation of new structures at the growing points of stems, and in the growth of leaves, flowers, and fruits. In many perennial plants, a large proportion of the new products is also transferred from the leaves to the stems, or to underground store-houses, *e.g.*, tubers of Potato, roots of Parsnip and Turnip, bulb-scales of Lilies, &c. There are thus descending currents of elaborated Sap, in Dicotyledons, usually outside of the ascending currents of crude Sap. The elaborated Sap descends by two chief routes: the first, down which pass dissolved starch and compounds of a similar kind, is believed to be through the *cellular* tissues of the bark, and, to some extent, the medullary rays and the pith; the second route, down which the protoplasmic substance passes, is believed to be the soft-bast, or innermost layer of the bark. Down this the

FIG. 415. A, SAPERDA POPULNEA, natural size; B, BRANCH OF POPLAR, showing Ravages committed by the Insect. (Page 358.)

latter stream flows, especially by means of the "sieve-tubes" — slender tubes of long cells, end to end, that are separated, only partially, by sieve-like cross walls, the openings in which allow the protoplasm to pass from cell to cell. A practical result of the situation of the descending current is that if a ring of bark is removed, or a tight ring of any material (*e.g.*, wire) is bound round a branch of any Dicotyledon of ordinary structure (*e.g.*, an Apple-tree), the elaborated Sap is prevented from passing downwards; a thickened border is produced above the obstruction, and the crop of fruit on the branch is increased, since it gets *all* the food produced in the leaves of the branch, while duly supplied with

Sap—*continued.*

crude Sap through the wood below the ring, which has been left uninjured. This process of ringing does not succeed in a Monocotyledon, or in a Dicotyledon with fibro-vascular bundles scattered among cellular pith, and in which the downward flow of Sap consequently remains unchecked, such as the species of Pepper (*Piper*). The causes of the upward flow of crude Sap are chiefly two, viz.: (1) in early spring, when growth begins, the absorption of fluid by root-hairs, probably due to chemical changes in the cell contents; and (2) afterwards, the free evaporation from the leaves, drawing fresh Sap upwards to supply what has been lost. Other forces also assist in a lesser degree; but to these reference need not now be made.

SAPERDA. A genus of Beetles, belonging to those that possess long antennæ, and a long, rather narrow body. The genus is recognised by the following group of peculiarities: The wing-cases reach to the hinder end of the body, which is cylindrical; the thorax has not a spine on either side; the antennæ have eleven joints; and the tasters have a long, sharp end-piece. The beetles vary from about ⅛in. to 1¼in. in length, and are mostly black, or nearly so. A good many British species have been described; but the most hurtful are those which attack Poplars, Aspens, and Willows. The larvæ feed in the wood of the branches, and sometimes cause distortions and swellings of the latter. The only treatment applicable is to cut off and destroy the branches swollen and tenanted by the insects. Fig. 415 (page 357) shows *S. populnea* (which is one of the most destructive species), and the injury inflicted by it on Poplars.

SAPINDACEÆ. A natural order of trees, shrubs, or under-shrubs, rarely herbs, dispersed over the whole globe, but most numerous in tropical regions. Flowers usually polygamo-dicœcious, variously coloured and disposed, generally small for the size of the plant, inodorous; sepals four or five, very rarely more or none, free or more or less connate, often unequal, imbricated; petals wanting or three to five, rarely more, the dorsal one often wanting, often scaly or bearded within, imbricated; disk variable, complete or incomplete, sometimes unilateral, very rarely deficient; stamens usually eight, rarely five or ten (very rarely two, four, twelve, or indefinite), usually hypogynous and inserted within the disk, rarely on its head or around the base; filaments usually elongated. Fruit capsular or indehiscent, drupaceous, baccate, or coriaceous, entire or lobed, rarely composed of two or three samaras. Leaves often evergreen, alternate, exstipulate or rarely stipulate, compound, abruptly pinnate; leaflets variable, in a few cases pellucid-dotted; petioles sometimes winged. Several of the species produce edible fruits, and others furnish valuable timber. The order comprises from 600 to 700 species, which are classified, by Bentham and Hooker, in genera and sub-orders as follows: *Acerineæ*, 3 genera; *Dodonææ*, 6; *Melianthæ*, 3; *Sapindeæ*, 59; *Staphyleæ*, 3—showing a total of seventy-four genera. Examples: *Acer*, *Dodonæa*, *Melianthus*, *Sapindus*, and *Staphylea*.

SAPINDUS (name altered from *Sapo-indicus*, Indian Soap; the aril which surrounds the seeds of *S. Saponaria* is used as soap in America). ORD. *Sapindaceæ*. A genus consisting of some forty species of tropical, sometimes slightly climbing trees and shrubs. Flowers regular, in terminal or axillary racemes or panicles; sepals and petals four or five; stamens eight to ten. Leaves alternate, exstipulate, simple and one-foliate or abruptly pinnate; leaflets entire or very rarely serrated. The species are of botanical and economic interest only. The hard, round, black seeds of some members of the genus are used for making rosaries, necklaces, bracelets, &c. One or two of the species have edible outer coverings to the fruits, but the seeds are poisonous.

SAPIUM (an old Latin name, originally given by Pliny to a resinous Pine; alluding to the unctuous exudation from the wounded trunk). SYNS. *Carumbium*, *Stillingfleetia*, *Triadica*. ORD. *Euphorbiaceæ*. A genus comprising about twenty-five species of stove, evergreen, often glabrous trees or shrubs, broadly dispersed over the warmer regions of the globe. Flowers (? always) monœcious, apetalous, the males often three to a bract, the females many at the base of the spikes; spikes or racemes terminal, solitary, or in one species several, paniculate. Leaves alternate, petiolate, entire, or rarely toothed, penniveined; petioles often biglandular at apex. A few of the species have been introduced, but they are now probably lost to cultivation.

SAPODILLA OR SAPOTILLA PLUM. *See* **Sapota Achras.**

SAPONARIA (from *sapo*, soap; the leaves of *S. officinalis* form a lather, which much resembles that of soap, and is similarly efficacious in removing grease-spots, &c.) Fuller's Herb; Soapwort. Including *Vaccaria*. ORD. *Caryophylleæ*. A genus comprising about thirty species of hardy or half-hardy herbs, sometimes annual and with the habit of *Gypsophila*, sometimes biennial or perennial and resembling the species of *Silene*; they are natives of Europe (mostly Southern), the Mediterranean region, and extra-tropical Asia. Calyx ovoid or oblong-tubular, five-toothed, obscurely nerved; petals five, with a narrow claw, and an entire or emarginate blade, scaly or naked at base; stamens ten. Radical leaves spathulate; cauline ones narrower. The species described below are very ornamental. *S. ocymoides* is particularly well adapted for decorating rockwork. *S. cæspitosa* and *S. lutea* thrive in a compost of sand, loam, and peat, with good drainage in the pots. All are readily propagated by seeds, or by division. The hardy annual and biennial kinds simply require to be sown in the open border.

S. cæspitosa (tufted). *fl.* rose-coloured, somewhat umbellate calyx profoundly lobed; petals emarginate at the apex, with bifid appendages in the throat. July and August. *l.* linear, glabrous, almost all radical, scarcely toothed. *h.* 3in. to 6in. Pyrenees, 1824. Half-hardy perennial. (G. C. n. s., xv. 501; R. G. 815.) SYN. *S. elegans.*

S. calabrica (Calabrian).* *fl.* of a beautiful rose-colour, axillary, solitary; petals orbicular, narrowed at the base. August. *l.* obovate-spathulate, usually one-nerved, smooth or slightly pubescent, ciliated on the margins. Stem erect, dichotomously branched. *h.* 6in. to 12in. Calabria, 1830. Hardy annual. (R. G. 11; S. B. F. G. ser. ii. 79.)

S. elegans (elegant). A synonym of *S. cæspitosa.*

S. glutinosa (glutinous). *fl.* blood-coloured, panicled, in corymbose bundles; calyx long, terete; petals minute, bidentate at apex, crowned with scales in the throat. June and July. *l.* ovate, three-nerved. Stem erect, branched. *h.* 1½ft. Eastern Europe, &c., 1817. Hardy biennial. (B. M. 2855.)

S. lutea (yellow). *fl.* capitate, involucrate; calyx woolly, with short lobes; petals yellow, obovate, entire; stamens violaceous. June to August. *l.* linear, ciliated at the base, almost all radical. *h.* 3in. to 6in. Alps, 1804. Half-hardy perennial.

S. ocymoides (Basil-like).* Rock Soapwort. *fl.* red or pink, in panicled bundles; calyx purple, cylindrical, villous. May to August. *l.* ovate-lanceolate, generally one-nerved. Stems dichotomous. Switzerland, Italy, &c., 1768. An elegant, hardy, perennial trailer, well suited for the ornamentation of rockwork. (B. M. 154; J. F. A. 23.)

S. officinalis (officinal).* Bouncing Bet; Common Soapwort, &c. *fl.* lilac or white, 1in. in diameter; petals obcordate; cymes in panicled corymbs. August and September. *l.* oblong-lanceolate, 2in. to 4in. long, three-ribbed. Stem straight, ascending, 1ft. to 3ft. high. Europe (apparently naturalised in Britain), temperate Asia. Hardy perennial, with a white, fleshy, creeping root-stock. (F. D. 543; Sy. En. B. 197.) *S. hybrida* is a variety with a gamopetalous corolla and connate upper leaves.

S. Vaccaria (Cow-herb). *fl.* red, paniculate; calyx pyramidal, smooth, five-angled; bracts membranous, acute. July and August. *l.* ovate-lanceolate, sessile. *h.* 1ft. to 2ft. Central Europe, 1596. Annual. (B. M. 2290.)

SAPOTA (the native name). SYN *Achras.* ORD. *Sapotaceæ.* A monotypic genus. The species is a very large, stove, evergreen tree, with milky juice. It thrives in rich, loamy soil, and may be increased by cuttings.

Sapota—*continued.*

S. Achras (Achras'). Bully-tree; Sapodilla or Sapotilla Plum. *fl.* whitish, rather large, pedicellate in the axils; calyx segments six, in two distinct series; corolla broadly sub-urceolate, six-lobed. May. *fr.* very luscious, resembling an apple in shape. *l.* petiolate, clustered at the tips of the branches, 3in. to 4in. long, elliptic-oblong, acute, glabrous; primary veins thick; petioles downy. Branches numerous, forming a spreading top. *h.* 10ft. to 50ft. West Indies and Central America, 1731. (B. M. 3111, 3112.) The correct name of this tree is *Achras Sapota.*

SAPOTA (in part), of A. de Candolle, R. Brown, &c. Synonymous with **Sideroxylon** (which *see*).

SAPOTACEÆ. A natural order of trees or shrubs, with milky juice, inhabiting tropical and sub-tropical regions. Flowers regular, hermaphrodite, or very rarely polygamous by abortion, not large, glomerate or fascicled at the nodes or in the axils, rarely solitary or fascicled; calyx inferior, persistent or deciduous; corolla gamopetalous, the tube campanulate or urceolate, or rarely elongated, the limb equal, the lobes equalling in number, or twice or four times as many as, the sepals; stamens affixed to the tube of the corolla, in one or two series, the filaments erect; anthers two-celled; pedicels minutely bracteate or ebracteate. Berry indehiscent, usually two to many-celled. Leaves alternate, very rarely sub-opposite, coriaceous or rarely membranous, entire, penniveined, exstipulate, or rarely with small, caducous stipules. "Several species of this order are useful to man. The fruits of *Lucuma mammosa* (the Marmalade of the West Indies) are a very agreeable food, as are those of *Achras Sapota* and various species of *Chrysophyllum*, which are much sought after in the Antilles; those of *Bassia* and *Imbricaria*, Asiatic genera, are also edible. . . . . Other *Sapotaceæ*, both Asiatic and African (*Sideroxylon, Argania*), are employed for building purposes, on account of the hardness of the wood, whence the name of Iron-wood" (Le Maoût and Decaisne). *Dichopsis gutta*, a Malayan tree, furnishes Gutta Percha. The order comprises about two dozen genera, and 320 species. Examples: *Chrysophyllum, Lucuma, Sideroxylon.*

SAPOTA, WHITE. A common name for *Casimiroa edulis.*

SAPPAN-WOOD. A common name for *Cæsalpinia Sappan.*

SAP WOOD. The new wood of an exogenous stem.

SARACA (said to be from *Sarac*, the native American name of the plant). SYN. *Jonesia.* ORD. *Leguminosæ.* A genus consisting of four or five closely-related species of unarmed, stove trees (or tall, climbing shrubs ?), natives of tropical America. Flowers yellow, rose, or scarlet, racemose; calyx segments four, petaloid, closely imbricated; petals absent; stamens three to nine, free; racemes disposed in short, much-branched, often lateral panicles; bracts small, deciduous. Pods oblong or elongated, two-valved. Leaves abruptly pinnate; leaflets coriaceous, often few-jugate; stipules small, caducous. The best-known species are described below. For culture, *see* **Brownia.**

S. inclinata (curved downwards). *fl.* yellowish-orange, disposed in fascicled panicles. *l.* pinnate, with six to eight pairs of oblong leaflets, which assume, when young, a beautiful reddish tint. Java and Sumatra. A very elegant species, closely allied to *S. indica.*

S. indica (Indian). *fl.* very rich orange, with much-exserted, crimson stamens. Summer. *l.* opposite, abruptly pinnate, with three to five pairs of oblong, shining, firm leaflets. India, 1796. (B. M. 3018, under name of *Jonesia Asoca.*)

SARACHA (named in honour of Isidore Saracha, a Benedictine monk, much attached to botany; he enriched the Royal Gardens at Madrid with many rare plants). SYNS. *Bellinia, Jaltomata.* ORD. *Solanaceæ.* A genus consisting of about a dozen species of diffuse or sub-erect, greenhouse or hardy herbs, natives of Western America, from Bolivia to Mexico. Calyx broadly campanulate, shortly five-fid; corolla sub-rotate or very broadly campanulate, with a deeply five-fid limb; stamens five; peduncles short. Leaves entire or broadly sinuate-toothed. The two species mentioned below are hardy annuals, thriving in ordinary garden soil. Seeds should be sown in the open border, during spring.

Saracha—*continued.*

S. stapelioides (Stapelia-like). *fl.* pale yellow, with five reddish-brown, yellow-veined blotches; corolla rotate, the lobes rounded and apiculate; peduncles axillary, solitary or rarely twin, one-flowered. Summer. *l.* slightly cordate or rounded at base, ovate, scarcely acuminate, entire or sinuate-toothed, scattered, the lower ones solitary, the upper ones twin. Stem erect, herbaceous or suffruticose at base. *h.* 1½ft. 1865. Greenhouse. (R. G. 465.)

S. umbellata (umbel-flowered). *fl.* cream-coloured or greenish-white; corolla plicate; umbels pedunculate, seven to ten-flowered, axillary, solitary. June and July. *l.* ovate, wrinkled, entire, shining, acute, scabrous; floral ones twin. *h.* 2ft. to 4ft. Peru, 1822. (S. B. F. G. 85.)

SARCANTHUS (from *sarx, sarkos*, flesh, and *anthos*, a flower; referring to the substance of the flowers). ORD. *Orchideæ.* A genus including about a score species of stove, epiphytal orchids, inhabiting the East Indies, South China, and the Malayan Archipelago. Flowers often yellowish-green, purplish within, small, shortly pedicellate; sepals and petals free, sub-equal, spreading, slightly fleshy; lip affixed to the base of the column, spreading, spurred at base, the lateral lobes short, ear-like, or oblique, the middle one ovate, oblong, or lanceolate; column oblong, sub-terete; pollen masses four; bracts small; peduncles lateral, often slender, simple or paniculately branched. Leaves distichous, coriaceous or fleshy, flat or terete. Stem leafy, not pseudo-bulbous. These plants should be grown in teak-baskets suspended near the glass in a moist stove. They thrive best in peat fibre and sphagnum, with a few lumps of charcoal about their roots. The species best known in gardens are here described.

S. arietinus (ram's-head). *fl.* greenish, with a rosy lip, having the medial lobe triangular and yellowish, and the side lobes purplish, numerous. *l.* straight, terete, as thick as a quill. Assam, 1869. A remarkably odd, stiff-looking plant.

S. belophorus (hammer-bearing). *fl.* of an ochreous colour, with two longitudinal, purple-brown stripes on the sepals, petals, and lip, small. *l.* ligulate, equally bilobed, undulated. 1883. A small species.

S. chrysomelas (dark-golden). *fl.* yellowish, having the disk of the sepals and petals blackish-purple, borne in a large panicle. *l.* broad, lorate, unequally bilobed. Moulmein, 1869.

S. erinaceus (hedgehog-like). *fl.* white, with a prettily rose-tinted lip, numerous; spikes pendent, axillary, the rachis red and hairy, as are also the ovaries. Moulmein, 1867. (B. M. 5630.) SYNS. *Aërides dasypogon, A. rubrum.*

S. filiformis (thread-like). *fl.* very small; sepals and petals chocolate-coloured, reflexed; lip pale yellow, tipped with pink; raceme seven or eight-flowered. *l.* filiform. East Indies, 1842. Allied to *S. teretifolius.* (B. M. 4630.)

S. flexus (zigzag panicled). *fl.*, sepals yellowish-brown, tipped outside with reddish-brown; petals yellowish-brown; spur of the lip whitish-yellow, the blade at first of the same colour, afterwards yellow; panicle zigzag. *l.* short, ligulate, bilobed. Borneo, 1881. A robust plant.

S. guttatus (spotted). A synonym of *Rhynchostylis retusa.*

S. Hincksianus (Hincks'). *fl.* smaller; sepals and petals green, with three equal, red stripes: side lobes of lip blunt, and callus with medium angles; spur longer and more attenuated. Otherwise, this plant resembles *S. teretifolius*, but is more slender than that species. Native country uncertain. 1878.

S. laxus (loose). *fl.* dirty-white, somewhat fleshy; sepals oblong blunt acute; petals linear-ligulate, blunt acute; lateral laciniæ of lip erect, oblong, lobed, the middle one triangular, apiculate, hollowed out; spur conical; raceme long, many-flowered, lax, hairless. *l.* close together, few, short, very thick, oblong, bluntly bilobed or bidentate, keeled on the under side, and with numerous purple spots. Stems very short. Moulmein, 1865. (Ref. B. 109.)

S. Lendyanus (Lendy's). *fl.* borne in a small, loose panicle; sepals and petals greenish, with a purple disk; lateral lobes of the lip orange, with two purple lines, roundish, with introrse angles; middle lobe white, with purple spots, oblong; spur as long as the purple ovary. *l.* linear, blunt, bilobed. Saigon, 1884.

S. macrodon (long-toothed). *fl.* yellowish, streaked with purple; sepals and petals oblong, nearly straight; lip trifid; bracts very minute; raceme elongated, loosely many-flowered. *l.* abbreviated, oblong-ligulate, toothed at apex. India, 1872. A small and not particularly ornamental species.

S. mirabilis (wonderful). *fl.* yellowish, with a purplish spur,

Sarcanthus—*continued.*

small, disposed in an erect, racemose panicle 1½ft. long. *l.* 6in. long. India, 1878. A plant of no particular merit.

S. paniculatus (panicled). *fl.* yellowish; sepals and petals marked with two blood-coloured stripes, linear-oblong, undulated; blade of lip two-horned; spur straight; spike paniculate. *l.* long-lorate, obliquely bilobed and obtuse at apex. China. SYN. *Aërides paniculatum* (B. R. 220).

S. Parishii (Parish's). *fl.* yellow, with a rose-coloured lip, small, produced in slender spikes. *l.* lorate, obliquely tipped. Moulmein, 1861. An inconspicuous plant. (B. M. 5217.)

S. rostratus (beaked). *fl.* borne in a simple, horizontal spike equalling the leaves; sepals and petals yellowish-green, with sanguineous margins; lip violet, produced into a beak. *l.* lanceolate, acute, flat, sub-recurved. China, 1824. (L. C. B. 39B.)

S. striolatus (slightly striated). *fl.*, sepals and petals orange-coloured, with two cinnamon, parallel, longitudinal bars; lower part of the spur white, the upper part of the lip orange. Philippine Islands, 1882.

S. succisus (lopped-off). *fl.*, sepals and petals yellowish-green, purple in the middle, obtuse; lip yellow, blood-coloured at apex; spike simple, horizontal or deflexed, longer than the leaves. *l.* oblong, slightly undulated, præmorse. China, 1824. (B. R. 1014.)

S. teretifolius (terete-leaved). *fl.*, sepals and petals yellowish-green, marked with sanguineous veinings, obtuse, reflexed; lip white, the margins of the throat violet; spur straight, obtuse, pubescent within; spike simple, horizontal, equalling the leaves. *l.* terete. China, 1819. (B. M. 3571.) SYN. *Vanda teretifolia* (L. C. B. 6).

S. Williamsonii (Williamson's). *fl.* of a pretty amethyst-colour, disposed in spreading panicles. *l.* pale green, terete. Assam. 1865. An elegant little plant, resembling a diminutive *Vanda teres.*

SARCOCAPNOS (from *sarx*, *sarkos*, flesh, and *Kapnos*, the Greek name for Fumitory; the species have fleshy leaves). ORD. *Papaveraceæ.* A small genus (four species) of hardy, dwarf, tufted, perennial herbs, inhabiting the Spanish Peninsula or North Africa. Flowers white, yellow, or purplish; sepals two, scale-like; petals four, erecto-connivent, one of the two outer ones spurred at base, the other flat, the inner ones narrow and cohering at apex; stamens six; racemes terminal, few-flowered. Leaves dissected; segments usually broad and rather thick. *S. enneaphylla*, the only species introduced, thrives in the open border or on rockwork. It may be readily increased by seeds, or by cuttings.

S. enneaphylla (nine-leaved). *fl.* yellow, marked with purplish above, small, in short racemes of about ten. June. *l.* triternately parted, on long, slender petioles; leaflets roundish-ovate, sometimes cordate at base, mucronulate at apex, the terminal one usually larger. Stems 2in. to 5in. high, slender, suffruticose at base. Southern Europe, &c., 1714.

SARCOCARP. The fleshy or succulent portion of a drupe, lying between the epicarp and endocarp. The term is sometimes used to generally indicate a baccate fruit.

SARCOCARPON. A synonym of **Kadsura** (which *see*).

SARCOCAULON (from *sarx*, *sarkos*, flesh, and *caulon*, a stem; alluding to the fleshy stems). ORD. *Geraniaceæ.* A genus comprising three species of divaricately-branched, fleshy or succulent, rigid, greenhouse herbs or sub-shrubs, armed with spines formed out of persistent and hardened petioles; they are confined to South Africa. Flowers purple, on axillary, one flowered peduncles; sepals five, imbricated; petals five, hypogynous, imbricated; stamens fifteen. Leaves small, on the spinous petioles, or tufted or solitary in the axils of the thorns. The species thrive best in a compost of loam, peat, and leaf mould or sand. Propagation may be readily effected by young cuttings, inserted in sand, under a glass; or by cuttings of the roots.

S. Burmanni (Burmann's). *fl.* 1½in. to 2in. broad; petals twice as long as the mucronate sepals; stamens five long and ten shorter. May. *l.* obovate-cuneate, ½in. to ¾in. long, incisocrenate, glabrous or downy, fleshy, on short petioles. *h.* 1ft. 1800. (B. M. 5729.)

S. L'Heretieri (L'Heritier's). *fl.*, petals not much exceeding the cuspidate, attenuated sepals. May. *l.* obovate or obcordate, acute or obtuse, entire, glabrous. *h.* 1ft. 1790. This is often confounded with *S. Patersoni.*

Sarcocaulon—*continued.*

S. Patersoni (Paterson's). *fl.* smaller than in either of the other species; petals not twice as long as the obtuse, mucronate sepals. May. *l.* cuneate or obcordate, obtuse or mucronulate, entire, glabrous. *h.* 2ft. 1827.

SARCOCEPHALUS (from *sarx*, *sarkos*, flesh, and *kephale*, a head; alluding to the fleshy heads of fruit). Guinea Peach. SYN. *Cephalina.* ORD. *Rubiaceæ.* A genus comprising about eight species of stove shrubs or trees, sometimes climbing, with terete or obtusely quadrigonal branchlets; they inhabit tropical Asia, Africa, and Australia. Flowers white or yellow; calyx limb truncate, obscurely five or six-toothed; corolla tubular-infundibuliform, the limb of five or six rounded lobes; heads terminal and axillary, pedunculate, sometimes paniculate, ebracteate. Fruit globose, one-celled. Leaves opposite, petiolate, sub-coriaceous; stipules interpetoliar, mediocre and triangular or ample and obovate, deciduous. *S. esculentus* is an interesting, climbing shrub, seldom seen in collections. It should be grown in a compost of loam, peat, and sand. Cuttings will root, if inserted in sand, under a glass, in heat. *S. cordatus* requires similar treatment.

S. cordatus (heart-shaped). *fl.* yellow, in dense, globular heads above 1in. in diameter without the styles; corolla about ¼in. long. May. *l.* broadly ovate, obtuse, rounded, cuneate, or broadly heart-shaped at base, 4in. to 10in. long, sometimes softly pubescent beneath; stipules large, quickly deciduous. *h.* 10ft. or more. Australia and India, 1820. A handsome tree. SYN. *Nauclea coadunata.*

S. esculentus (edible). Guinea, Negro, or Sierra Leone Peach. *fl.* pinkish, in short, terminal, pedunculate or sessile heads. July. *fr.* in heads the size of a peach. *l.* shortly petiolate, roundish-oval, shining above, pubescent in the axils of the veins beneath; stipules solitary, triangular. A tall tree, sometimes a scandent shrub, about 20ft. high. Sierra Leone, 1822.

SARCOCHILUS (from *sarx*, *sarkos*, flesh, and *cheilos*, a lip; alluding to the fleshy lip). SYNS. *Dendrocolla*, *Thrixspermum.* Including *Camarotis*, *Gunnia*, *Micropera*, and *Ornitharium.* ORD. *Orchideæ.* A genus embracing some thirty species of stove, epiphytal, caulescent, not pseudo-bulbous orchids, natives of the East Indies, the Malayan Archipelago, the Pacific Islands, and Australia. Flowers mediocre or small (in *S. Calceolus* showy); sepals and petals spreading, the lateral sepals often more or less adnate to the foot of the column; lip without a spur, three-lobed, the lateral lobes petaloid or tooth-like, the middle one variable, fleshy; column erect; pollen masses two, globose, or four more or less connate in a pair; peduncles lateral, simple or rarely branched. Leaves coriaceous or fleshy, oblong or linear, distichous, or sometimes very few or deficient. "In many respects, the genus resembles *Dendrobium*, but differs much from it in the form of the pollen masses, in their attachment to a caudicle, and in the seed capsule and seed" (Fitzgerald). The two species of this genus most common in gardens are *S. Fitzgeraldi* and *S. Hartmanni.* These should be grown in a greenhouse temperature, along with such plants as *Odontoglossum citrosmum.* They like a moist atmosphere, subdued light, and plenty of water at the root always. Peat and sphagnum are the best mixture for them. The species known in gardens are here described.

S. Calceolus (slipper-like). *fl.* white; sepals and petals fleshy, oblong, acute; middle lobe of lip slipper-like, but closed up, the lateral lobes ascending, triangular; peduncles short, two-flowered. *l.* oblong, fleshy, obliquely emarginate, obtuse. Stem elongated. Manilla, 1844. (B. R. 1846, 19.)

S. cochinchinensis (Cochin China). *fl.* yellowish, glutinous; sepals striped with brown over the middle nerves outside, and with some dark yellow patches under the column; racemes small. *l.* rather narrow, linear-ligulate, bilobed at apex. Cochin China, 1877. SYN. *Camarotis cochinchinensis.*

S. falcatus (sickle-shaped). *fl.* white, usually three or four, distant; lateral sepals adnate to the basal projections of the column; peduncles scarcely exceeding, sometimes shorter than, the leaves. *l.* oblong, often falcate, 2in. to 4in. long. Stems 2in. to 3in. high. Australia, 1821. (B. R. 1832.)

S. Fitzgeraldi (Fitzgerald's).* *fl.* snowy-white, spotted with rich lake or maroon; lip not half the length of the sepals, the lateral

Sarcochilus—*continued.*

lobes falcate; peduncle, with the raceme, 6in. to 12in. long. *l.* 3in. to 6in. long. Australia, 1877. Habit that of *S. falcatus.*

S. Freemanii (Freeman's). *fl.* yellow, with brownish spots and streaks, numerous in a raceme; sepals very long, narrow-linear; petals a little shorter than the sepals; lip small, saccate, tridentate. *l.* ligulate, here and there undulated, bidentate, 6in. to 7in. long, 1¼in. wide. Assam, 1875. An elegant, dwarf species. SYN. *Thrixspermum Freemanii.*

S. Hartmanni (Hartmann's). *fl.* beautiful creamy-white, rather small; sepals and petals with brick-red spots at base; side laciniæ of the lip spotted and streaked with brick-red, semi-falcate or oblong, the middle lacinia yellow; callus yellow, with red spots; raceme dense. *l.* generally four, rather thick, ligulate, bidentate. Queensland, 1877. SYN. *Thrixspermum Hartmanni.*

S. ionosmum (Violet-scented). *fl.* about 1in. across, flat, in an open panicle, with a pleasant, Violet-like scent; sepals and petals yellow, blotched with cinnamon-brown, obovate, obtuse; lip white, with a few red streaks, the basal lobes acute and much smaller than the middle one. *l.* ensiform. Manilla, 1844. (B. R. xxxiii. 41.)

S. olivaceus (Olive-like). *fl.*, sepals and petals dull pale purple or yellowish-brown, much contracted below the middle; lip white, streaked with red, about half as long as the sepals; racemes loose, two or three-flowered. *l.* oblong, often falcate, 2in. to 3in. long. Stems less than 1in. long. Australia.

S. pallidus (pale). *fl.* pale yellow, mediocre, eight to fifteen in a short raceme. *l.* broadly linear, arcuate, oblique at apex, somewhat three-toothed. Sylhet. SYN. *Micropera pallida.*

S. teres (terete). *fl.*, sepals and petals white, spotted, fleshy, obtuse; lip white, with a few violet stains and a deep purple, round knob at the end. *l.* ovate-oblong or oblong, unequal at apex, flat, fleshy, pale green, 5in. long, 1½in. broad. India. SYN. *Ornitharium striatulum* (L. & P. F. G. i. 117).

SARCOCOCCA (from *sarx, sarkos*, flesh, and *kokkos*, a berry; alluding to the fleshy fruits). SYN. *Lepidopelma.* ORD. *Euphorbiaceæ.* A small genus (three species) of stove or greenhouse, glabrous shrubs, natives of the East Indies and the Malayan Archipelago. Flowers monœcious, apetalous; racemes small, dense, clustered about the axils. Fruit sub-drupaceous, ovoid or globose, indehiscent. Leaves alternate, shortly petiolate, entire, coriaceous, penniveined or triplinerved. The species introduced thrive in sandy loam. Propagation may be effected by cuttings, inserted in sand, under a glass, with a little heat.

S. Hookeriana (Hooker's). *fl.* yellowish; inflorescence short, equalling the petioles, loose-flowered; bracts ovate-lanceolate. June. *l.* 2in. to 3in. long, narrow-lanceolate, acuminate, acute at base, somewhat coriaceous, slightly shining above or opaque, penninerved; petioles about ¼in. long. *h.* 1ft. to 4ft. Sikkim Himalayas. Half-hardy (hardy in the South of England).

S. saligna (Willow-like). *fl.* pale yellow; inflorescence scarcely exceeding the rather short petioles; bracts of the male peduncles ovate, acute; bracteoles oblong-ovate, acuminate. June. *l.* linear-lanceolate, long-narrowed to the base, with a very long, cuspidate acumen at apex. *h.* 4ft. Nopaul, 1820. Greenhouse. (B. R. 1012, under name of *S. pruniformis.*)

S. s. coriacea (leathery). *fl.*, inflorescence loose, nearly equalling the petioles; female peduncles twin or ternate, slender. (H. E. F. 148, under name of *Pachysandra coriacea.*)

S. s. latifolia (broad-leaved). *l.* broad or narrow ovate-lanceolate, acute at base.

SARCOCOLLA (an old name used by Pliny for a kind of gum, from *sarx, sarkos*, flesh, and *kolla*, glue; in reference to the resinous secretion from some of the species). ORD. *Penæaceæ.* A genus comprising nine or ten species of small, greenhouse, South African shrubs, with the habit and inflorescence of *Penæa.* Flowers often larger; perianth tube cylindrical, often elongated; lobes valvate, the margins recurved, nearly reduplicate. Floral leaves in the typical species coloured. Sarcocool, a gum-resin now seldom met with, is generally said to be the produce of *S. squamosa.* The species known to cultivation are here described. For culture, *see* **Penæa.**

S. imbricata (imbricated). *fl.* pink; perianth ¼in. long, the tube scarcely longer than the lobes; bracteoles oblong-linear, shorter than the obovate, mucronate bracts. June. *l.* approximate, broadly ovate, acute, four to five lines long; young ones quadrifarious, erect. *h.* 1½ft. 1824. SYN. *Penæa imbricata* (B. M. 2809).

S. squamosa (scaly). *fl.* red; bracteoles linear or linear-spathulate, ciliated, shorter than the bracts; bracts imbricated, as large as the leaves, broadly obovate, slightly mucronate, ciliated,

Sarcocolla—*continued.*

resinous, six to eight lines long and broad. June. *l.* broadly obovate, obtuse, mucronate, five to eight lines long, four to six lines broad; young ones erect; older ones spreading, mucro-glandular. *h.* 1ft. 1787. SYNS. *Penæa Sarcocolla, P. squamosa* (B. R. 106).

SARCOGLOTTIS. Included under **Spiranthes** (which *see*).

SARCOGONUM. A synonym of **Muehlenbeckia** (which *see*).

SARCOLOBUS (from *sarx, sarkos*, flesh, and *lobos*, a pod; the seed-vessels are fleshy). ORD. *Asclepiadeæ.* A small genus (two or three species) of stove, twining shrubs, natives of India and the Malayan Archipelago. Flowers small; calyx five-parted; corolla campanulate or sub-rotate, partly five-fid, the lobes twisted; corona wanting; cymes clustered. Leaves opposite, membranous or rather thick. The species are probably lost to cultivation.

SARCOPHYLLUS. Included under *Aspalathus.*

SARCOPODIUM. The species formerly classed under this name are now removed, by Bentham and Hooker, to *Bulbophyllum* and *Dendrobium.*

SARCOSTEMMA (from *sarx, sarkos*, flesh, and *stemma*, a crown; the leaflets of the inner corona are fleshy). ORD. *Asclepiadeæ.* A genus of climbing or decumbent, leafless, stove shrubs, with slightly fleshy branches, natives of tropical and sub-tropical Asia, Africa, and Australia. Eight species have been described, but the number may be reduced to four or five. Flowers rather small; calyx deeply five-fid; corolla sub-rotate, deeply five-fid, the lobes twisted; corona often duplex, the outer one annular or cyathiform, the inner one of five erect scales; cymes umbelliform, the receptacle or rachis often clavate. *S. Brunonianum*, the species best known to cultivation, requires culture similar to **Ceropegia** (which *see*). The American species formerly included in this genus are now referred to *Philibertia.*

S. Brunonianum (Brown's). *fl.* bright yellow; column very short; inner processes of the corona almost concealing the anthers; stigma very shortly conical; umbels chiefly lateral. India, 1872. (B. M. 6002.)

SARIBUS. A synonym of **Livistona** (which *see*).

SARMENTOSE. Producing long runners or sarments; *e.g.*, those of the Strawberry.

SARMIENTA (named after Mart. Sarmiento, a Spanish botanist). ORD. *Gesneraceæ.* A monotypic genus. The species is a greenhouse, glabrous shrub, creeping or climbing over trees and rocks. This wiry-stemmed plant does not always grow well under cultivation. It should be planted in soft peat, mixed with sphagnum and charcoal, and either in a small pan or orchid-basket. Healthy plants have been grown on a piece of soft Tree-fern stem. *S. repens* likes abundance of water, shade from bright sunshine, and a position near the glass in a moist greenhouse. It would thrive in a house where Lapagerias are grown.

S. repens (creeping).* *fl.* scarlet, solitary in the axils, peduncular; calyx free, five-parted; corolla tube elongated, swollen; limb slightly oblique, of five rounded, spreading lobes. Summer. *l.* opposite, rather small, somewhat fleshy, entire or with a few teeth. Stems slender. Chili, 1862. (F. d. S. 1646.)

SAROTES. Included under **Guichenotia** (which *see*).

SAROTHRA. Included under **Hypericum** (which *see*).

SARRACENIA (named by Tournefort, in honour of Dr. Sarrazin, of Quebec, who first sent species from North America to Europe). Indian Cup; Pitcher Plant; Side-saddle Flower; Trumpet Leaf. ORD. *Sarraceniaceæ.* A genus comprising half-a-dozen species of curious, half-hardy, herbaceous perennials, inhabiting North America. Sepals five, spreading; petals five, connivent; style expanded into a large, umbrella-shaped disk; scapes one-

Sarracenia—*continued.*

flowered, naked, with the exception of three bracteoles close to the calyx. Leaves radical, pitcher-shaped. The

Sarracenia—*continued.*

during the growing season. A moderately cool house, and a moist, close atmosphere, are essential to the suc-

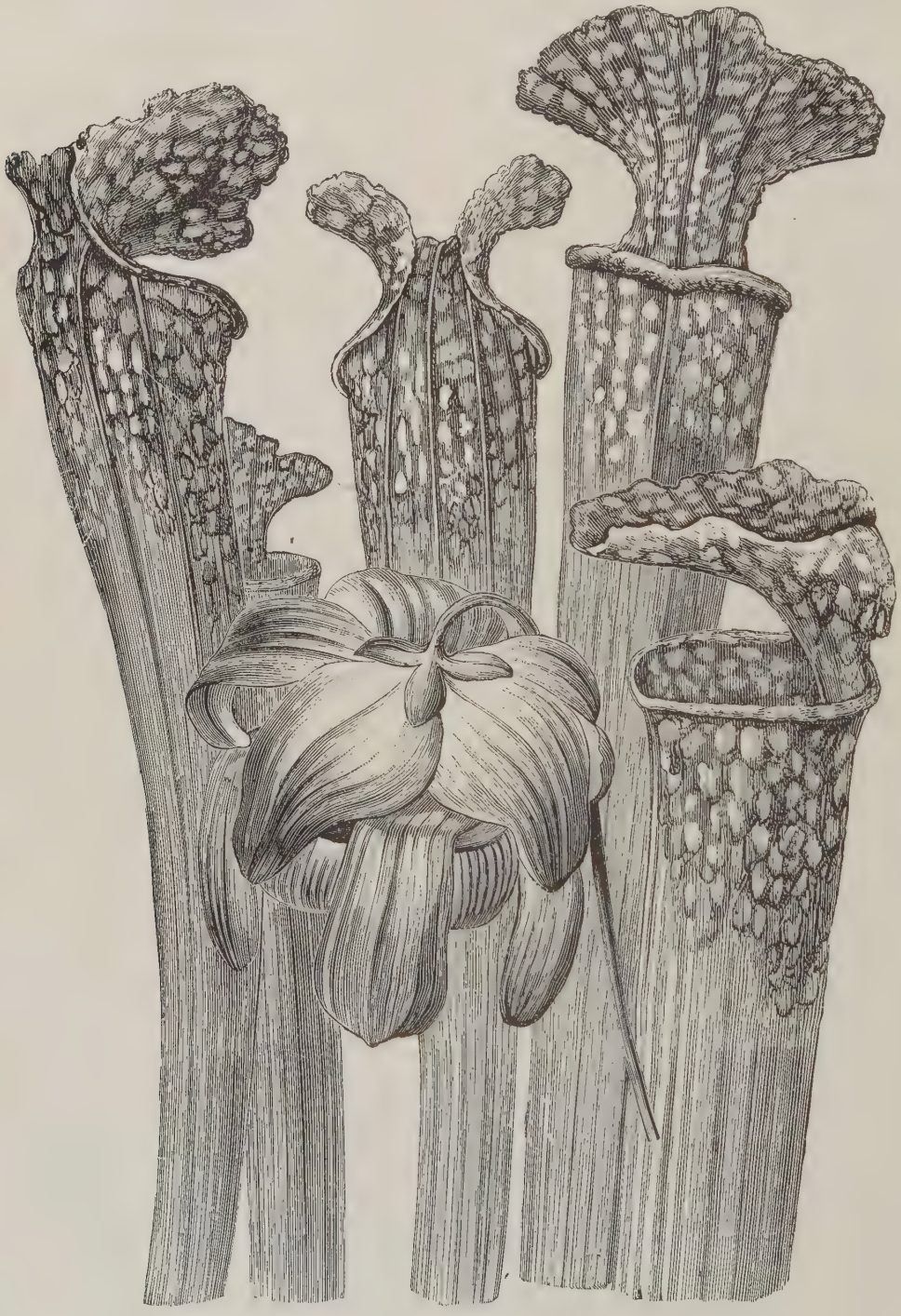


FIG. 416. UPPER PORTION OF PITCHERS AND FLOWER OF SARRACENIA DRUMMONDII.

species require to be potted in good, fibrous peat and sphagnum, such as will not readily become sour from the large administrations of water which are necessary

cessful culture of Sarracenias. The roots must never be allowed to get dry. Propagation may be effected by division of the crowns.

Sarracenia—*continued.*

S. Catesbæi (Catesby's). A form of *S. flava.*

S. Drummondii (Drummond's).* *fl.* purple, 3in. long; scapes longer than the leaves. April. *l.* 2ft. long, erect, trumpet-shaped, narrowly winged; lamina erect, rounded, short-pointed, hairy within, and, like the upper portion of the tube, white, variegated with reticulated, purple veins. 1829. This species has the peculiarity of producing a second crop of pitchers late in the season, which continue fresh on the plant during the winter. See Fig. 416, for which we are indebted to Mr. Wm. Bull. (F. d. S. 560 and 1071; F. M. iv. 208; G. C. n. s., xv. p. 633, and xvi. p. 8; L. & P. F. G. 1.) SYN. *S. undulata.*

Sarracenia—*continued.*

S. D. alba (white).* *l.* at apex, as well as the lamina, beautifully shaded and reticulated with transparent white. A tall-growing, garden variety. (G. C. n. s., x. p. 281.)

S. D. rubra (red).* Not quite so tall a grower as *S. D. alba*, but like it in other respects, except that the markings are bright red.

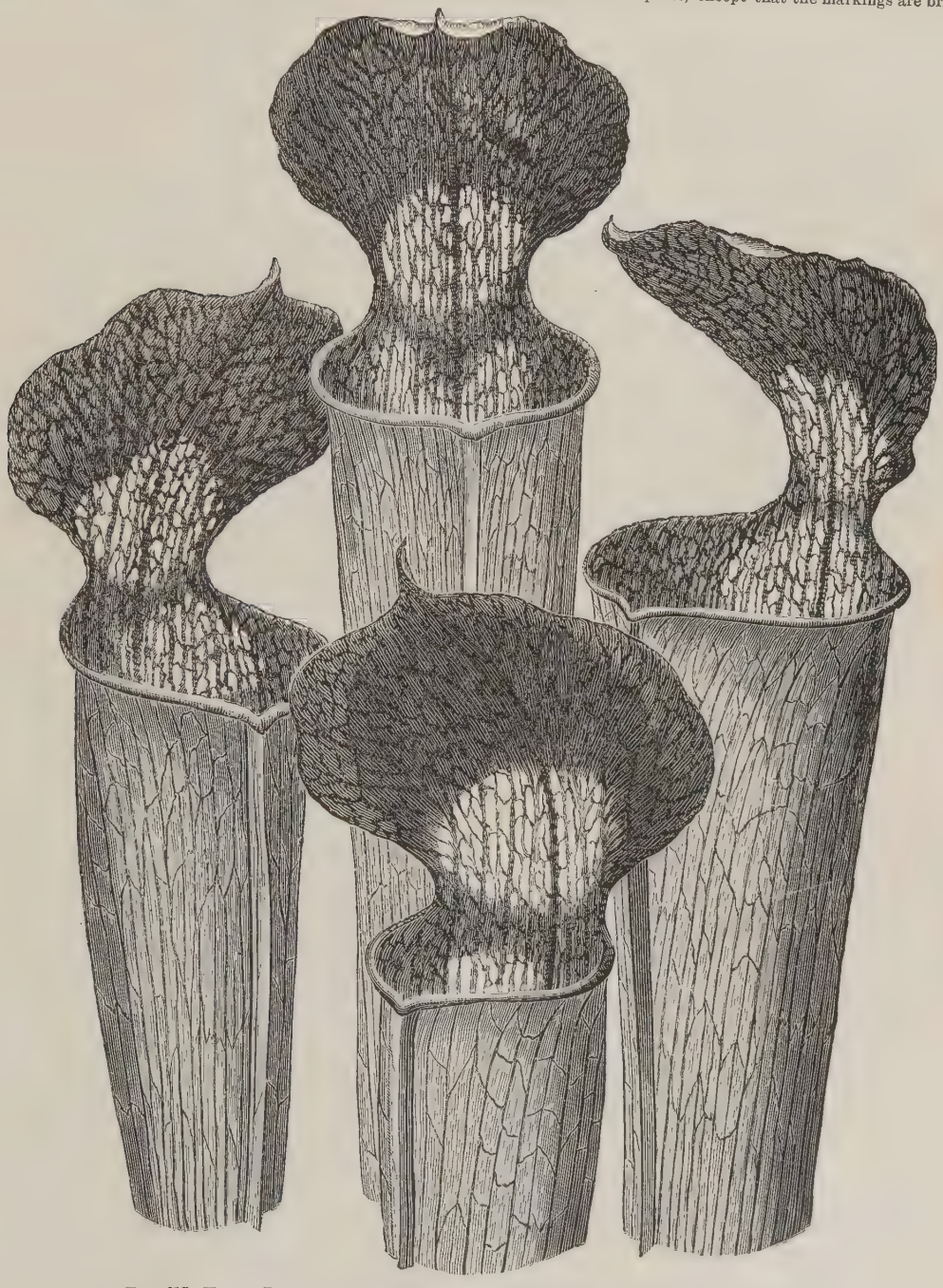


FIG. 417. UPPER PORTION OF PITCHERS OF SARRACENIA FLAVA ATROSANGUINEA.

S. Fildesi (Fildes'), of gardens. Probably synonymous with *S. flava Catesbæi.*

S. flava (yellow).* Trumpet Leaf; Watches. *fl.* yellow, 4in. to 5in. across; petals obovate-spathulate, undulated; stigma 2in. broad; scapes as long as the leaves. April and May. *l.* erect, 2ft. high, yellowish, trumpet-shaped, narrowly winged; lamina

Sarracenia—*continued.*

yellow, erect, orbicular, 3in. to 4in. wide, slender-pointed, tomentose within, reddish at the base, or reticulated with purple veins. 1752. (A. B. R. vi. 381; B. M. 780; F. d. S. x. 1068; I. H. ii. 63; L. B. C. 1957; R. G. 554.)

S. f. atrosanguinea (dark blood-coloured). *fl.* over 3in. across, campanulate; petals creamy-white; sepals primrose-yellow, curling over the sepals. *l.* long, narrow, funnel-shaped; lamina broad, roundish, at first green, with red reticulations, gradually passing to a rich, deep blood-red colour. See Fig. 417, for which we are indebted to Mr. Wm. Bull. (G. C. n. s., xvi. p. 13; I. H. xxvii. 386.)

S. f. Catesbæi (Catesby's). A form with very large pitchers, and a flat, roundish-cordate wing, traversed by red veins. "It is very doubtful, on the score of priority, whether this should not be taken as the type of the species" (Dr. Masters). SYNS. *S. Catesbæi, S. Fildesi* (?) (of gardens), and *S. flava picta.*

S. f. limbata (bordered). A large and remarkable form; the roundish lid marked all around the edge, on the lower side, with a band of brownish-crimson, ¼in. deep.

S. f. maxima (large). A very distinct, large, and handsome kind, having immense pitchers with broad lids, of a pale green colour.

S. f. ornata (adorned). *fl.* 6in. to 8in. in diameter; sepals greenish-yellow; petals of a rich canary-yellow, usually pendulous, in form resembling the falls of an Iris. *l.* recurved at the orifice; upper part strongly marked with well-defined reticulations of dark purplish-red, which are continued over the lamina. 1881. (G. C. n. s., xv. 114, 115, under name of *S. ornata.*)

S. f. picta (painted). A synonym of *S. f. Catesbæi.*

S. psittacina (parrot-beaked).* *fl.* purple, on scapes 1ft. high. April and May. *l.* 2in. to 4in. long, spreading; tube slender, broadly winged, marked with white spots, and reticulated with purple veins; lamina globose, inflated, incurved-beaked, almost closing the orifice of the tube. 1866. (F. d. S. 2063; G. C. n. s., xv. p. 816.)

FIG. 418. SARRACENIA PURPUREA.

S. purpurea (purple).* Huntsman's Cup. *fl.* purple; petals inflected over the stigma; scapes 1ft. high. April and May.

Sarracenia—*continued.*

l. 4in. to 6in. long, spreading; tube inflated, contracted at the throat, broadly winged; lamina reniform, erect, hairy within, often purple-veined. 1640. See Fig. 418. (B. M. 849; F. d. S. x. 1076; G. C. n. s., xv. p. 821; L. & P. F. G. ii. p. 25; P. M. B. iii. 221.)

S. rubra (red).* *fl.* reddish-purple, smaller than in *S. purpurea*; petals obovate; scapes exceeding the leaves. May. *l.* 10in. to 18in. high, erect, slender, narrowly winged, paler above, and reticulated with purple veins; lamina ovate, erect, beak-pointed, tomentose within. 1786. (L. B. C. 1163.)

S. r. acuminata (taper-pointed). *l.* erect, pale green, becoming freely reticulated with crimson veins near the top; lamina ovate, acuminate, much larger than the mouth, longitudinally meshed with crimson veins. (B. M. 3515, and H. E. F. 13, under name of *S. rubra.*)

S. undulata (wavy). A synonym of *S. Drummondii.*

S. variolaris (variolar). *fl.* yellow, 2in. wide; petals inflected over the stigma; scapes shorter than the leaves. May. *l.* erect, 6in. to 12in. high, trumpet-shaped, broadly winged, spotted with white near the yellowish summit; lamina ovate, concave, arching over the orifice of the tube, hairy and reticulated with purple veins within. 1803. (B. M. 1710; L. B. C. 803; S. B. F. G. ser. ii. 138, under name of *S. minor*; S. E. B. 53, under name of *S. aduncа.*)

HYBRIDS. By crossing the above species, many beautiful hybrids have been raised, of which the following may be taken as a representative selection:

S. Atkinsoniana (Atkinson's). *l.* long, narrow, and erect, green, with slight, red ribs and reticulations; lamina broad, cordate, green, marked with red ribs and veins. A distinct form, raised between *S. flava maxima* and *S. purpurea*, and partaking most of the characters of the former parent.

S. chelsoni (Chelsea).* *l.* richly coloured with crimson of a brighter hue than those of either parent. A beautiful hybrid between *S. rubra* and *S. purpurea*; the pitchers have the elongated form of *S. rubra* with the broader dilatation of *S. purpurea*, and take a position intermediate between the decumbent habit of the latter and the erect growth of the former. (G. C. n. s., xiii. p. 725, and xv. p. 817.)

S. Courtii (Court's).* *l.*, when young, bright crimson-purple from the middle upwards, reticulated with darker veins, changing with age to deep blood-red, with blackish-purple veins. 1885. A beautiful hybrid between *S. purpurea* and *S. psittacina.* (R. G. 1886, p. 29.)

S. crispata (curled). *fl.* fully 3in. across; petals white, drooping, recurved at the edges, *l.* erect, funnel-shaped; lamina erectly arched and roundish, and, as well as the upper part of the tube, marked by longitudinal pencillings of red, forming a rather open reticulation. Possibly a natural or wild hybrid between *S. flava* and *S. rubra.* (I. H. xxvii. 387; G. C. n. s., xv. p. 633, and xvi. p. 9, under name of *S. flava crispata.*)

S. excellens (excellent). *l.* green, becoming stained with close reticulations of purplish-red near the upper end, the pallid spots reddish externally; lid roundish, arching, and, with the upper part of the tube, suffused and mottled with dark red. Habit erect. Parents: *S. variolaris* and *S. Drummondii alba.*

S. exculta (adorned). *l.* erect, with a narrowish wing, pale green below, the upper end, as well as the roundish, incurved, undulated lamina, strongly blotched with white and reticulated with crimson veins. Intermediate in character between *S. flava atrosanguinea* and *S. Drummondii.*

S. exornata (ornamented). *l.* similar to those of *S. purpurea*, but more erect, slightly narrowed at the mouth, which is dark purple-red, revolute and glossy, the tube dark green, covered with purplish-red veins, the longitudinal ribs stout, with smaller and finer veins between; lamina erect, ovate, wavy, the dark purple-red ribs running up through it and diverging. The marking throughout is very bold and effective. Parents: *S. purpurea* and *S. crispata.*

S. formosa (beautiful).* A hybrid between *S. psittacina* and *S. variolaris.* "The pitchers have more of the decumbent habit of *S. psittacina* than of the erect growth of *S. variolaris*, and are about intermediate in length between those of the two parents. The broad, lateral wing is also intermediate in form, while the beak-like lid of the pitcher is altogether that of *S. psittacina.* All the upper portion of the pitcher has a bright crimson, reticulated nervation, with the characteristic white spotting of *S. variolaris*; the basal portion is pale fulvous-green" (Veitch). See Fig. 419, for which we are indebted to Messrs. Veitch and Sons.

S. illustrata (illustrated). *l.* long, funnel-shaped, strongly marked with longitudinal, crimson ribs, united by veins of a similar colour; lamina cordate, apiculate, green, marked by strong, red, curved veins, the outer of which extend to the margin. This resembles *S. flava* in habit. Parents: *S. flava picta* and *S. Stevensii.*

S. Maddisoniana (Maddison's). *l.* rather erect, short, broad, green, with dull veins outside; mouth translucent-spotted; lamina large, incurved over the tube, ovate, wavy, strongly ribbed with deep purple-red veins. Habit dwarf. Parents: *S. variolaris* and *S. psittacina.*

Sarracenia—*continued.*

S. melanorhoda (dark red). *l.* semi-decumbent, elongated, funnel-shaped, gradually increasing in diameter from the base to the aperture, when mature blood-red, veined with blackish-crimson; wing broad; lamina erect, crisped, reddish-yellow, veined with blackish-crimson, hairy on the side facing the aperture. Parents: *S. Stevensii* and *S. purpurea*. See Fig. 419.

Sarracenia—*continued.*

mondii rubra and *S. purpurea*. See Fig. 420, for which we are indebted to Mr. Wm. Bull.

S. Moorei (Moore's). *fl.* about 4in. in diameter, pendulous, fragrant; sepals greenish, tinted with rose outside; petals deep rosy-pink outside, pale creamy-pink within, 2¼in. long. *l.* about 2ft. high, erect, trumpet-shaped, winged, 4in. in diameter at the

FIG. 419. PITCHERS OF (1) SARRACENIA MELANORHODA AND (2) S. FORMOSA.

S. Mitchelliana (Mitchell's).* *l.* curved, funnel-shaped, broadest at the top, olive-green, traversed by a profuse network of fine red veins, the whole changing, later on, to reddish-crimson; lamina cordate-reniform, undulated, with a bold reticulation of deep crimson-red. A very elegant plant. Parents: *S. Drummondii rubra* and *S. purpurea*.

mouth, green; lamina about 3in. across, sessile, hairy, with a network of crimson veins inclosing lighter spaces. Parents: *S. flava* and *S. Drummondii*. (G. C. n. s., xvi. p. 44.)

S. Popei (Pope's). *fl.* 4in. in diameter; sepals greenish, flushed with red, ovate-oblong; petals twice as long as the sepals,

Sarracenia—*continued.*

oblong-obovate, white at base, the rest velvety-crimson, margined with pale yellow, creamy-pink within. *l.* erect, about 2ft. high, slender, trumpet-shaped; lamina 3½in. across, ovate, acuminate. Parents: *S. flava* and *S. rubra.* (G. C. n. s., xvi. p. 41.)

Sarracenia—*continued.*

S. Swaniana (Swan's). *l.* funnel-shaped, slightly incurved, greenish-purple, the inside of the tube, as well as the lamina, being closely reticulated with crimson veins; wing rather broad; lamina cordate-ovate, bilobed at the apex. A handsome and

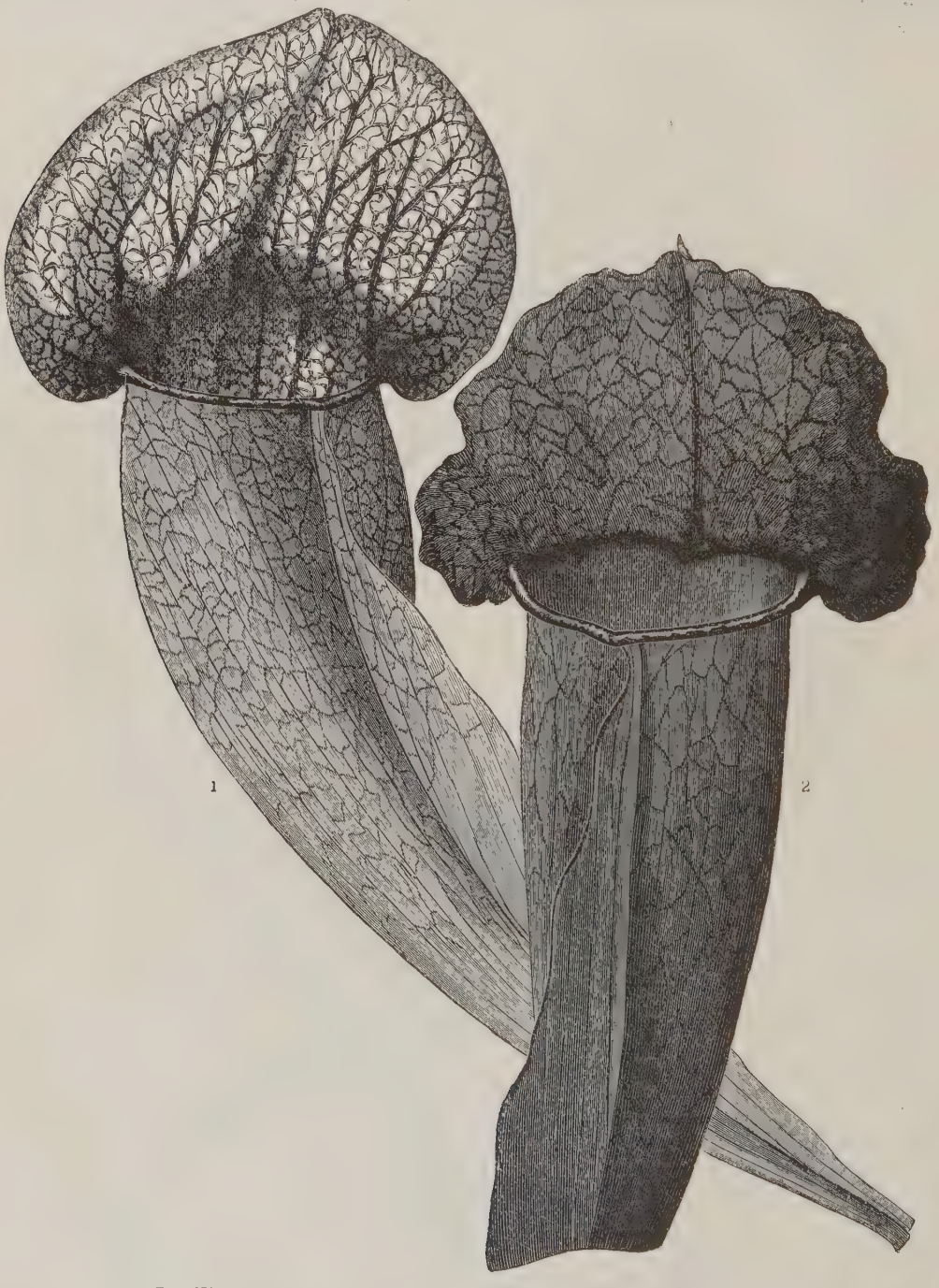


FIG. 420. PITCHERS OF (1) SARRACENIA SWANIANA AND (2) S. MITCHELLIANA.

S. Stevensii (Stevens'). *l.* large and erect, with prominent, straight, deep crimson veins, the interstices traversed with numerous veinlets of the same colour; lamina large, crisped, deep crimson. Parents: *S. purpurea* and *S. flava*, the latter being the seed-bearer. (G. C. n. s., xvi. p. 40.)

well-marked hybrid between *S. variolaris* and *S. purpurea.* See Fig. 420.

S. Tolliana (Toll's). *l.* long, slender, funnel-shaped, the orifice appearing as if cut straight across, with a recurved margin, either wholly deep purple-red with darker ribs and veins, or

Sarracenia—*continued.*

greenish with dark purple ribs and veins; lamina broadly reniform, undulated, reticulated with reddish-purple. Parents: *S. Drummondii alba* and *S. flava.*

S. Williamsi (Williams').* *l.* quite erect, rather short, funnel-shaped, constricted a short distance below the apex, green, ribbed with deep purplish-crimson; wing veined with purplish-crimson; lamina very broad and full, cordate-reniform, strongly marked by trichotomous ribs, united by smaller veins, the inside more closely reticulated with deep purplish-crimson. A very distinct and striking hybrid between *S. purpurea* and *S. flava.*

SARRACENIACEÆ. A very small natural order of curious, perennial herbs, inhabiting turfy, spongy bogs in America. Flowers solitary or few, large, racemose, nodding; sepals four or five, free, hypogynous, closely imbricated from the base, sub-petaloid, persistent; petals five, free, hypogynous, imbricated, deciduous, or (in *Heliamphora*) wanting; stamens numerous, hypogynous, free; filaments filiform; anthers two-celled; scapes naked or few-bracted. Leaves all radical, with a tubular or amphora-shaped petiole (pitcher); blade (lid) small, rounded, usually lying on the orifice of the petiole. "*Sarracenia rubra* has been vaunted in Canada as a specific against small-pox, but has not proved such. The pitcher-shaped leaves are effective insect traps; a sugary secretion exudes at the mouth of the pitcher, and attracts the insects, which descend lower in the tube, where they meet with a belt of reflexed hairs, which facilitate their descent into a watery fluid that fills the bottom of the cavity, and at the same time prevents their egress" (Le Maoût and Decaisne). The order embraces three genera—*Darlingtonia, Heliamphora,* and *Sarracenia*—and eight species.

SARSAPARILLA. A name applied to the roots of several plants, more especially those of certain species of *Smilax.*

SASHES. Any framework in a glass structure, in which glass is embedded, whether fixed to the rafters or not, might be called a Sash, but the term is most generally used in reference to glazed frames which open for purposes of ventilation in a house, or are used on pits, &c., where they may be kept on or pulled off, as considered requisite. These latter are called movable Sashes. In houses of modern construction, most ventilating Sashes are made to open by means of iron gearing and levers, an arrangement which is much to be commended for its easy and effectual mode of working.

SASSAFRAS (from *Sassafras,* the Spanish word for Saxifrage, like virtues to which plant it was supposed to possess). ORD. *Laurineæ.* A monotypic genus. The species is an ornamental, hardy, deciduous tree, with spicy-aromatic bark, and very mucilaginous twigs and foliage. In Virginia, a kind of beer is manufactured from the young shoots; other parts of the tree are of economical value, the oil extracted from the fruits being used by perfumers. The tree is frequently grown in this country; it is remarkable for the variety it exhibits in the shape and size of its leaves. For culture, &c., *see* **Laurus.**

S. officinale (officinal). Sassafras-tree. *fl.* greenish-yellow, shortly and loosely racemose; perianth tube very short, the limb segments six (sometimes variously abnormal); bracts small, narrow; racemes nearly umbelliform, shortly pedunculate. April. *l.* alternate, membranous, penniveined, ovate, entire, or some of them three-lobed, soon glabrous. *h.* 15ft. to 30ft. Eastern United States, 1633. (B. M. Pl. 220; T. S. M. 360.) SYN. *Laurus Sassafras.*

SASSAFRAS, CALIFORNIAN. *See* **Umbellularia californica.**

SASSAFRAS, SWAMP. A common name for *Magnolia glauca.*

SASSAFRAS, TASMANIAN. A name applied to *Atherosperma moschata.*

SASSAFRAS-TREE. *See* **Sassafras officinale.**

SATIN FLOWER. *See* **Sisyrinchium.**

SATIN MOTH. *See* **Liparis.**

SATINWOOD-TREE. *See* **Chloroxylon Swietenia.**

SATIVUS. Cultivated.

SATUREIA (the old Latin name used by Pliny). ORD. *Labiatæ.* A genus comprising about fourteen species of highly aromatic, hardy herbs or under-shrubs; one is a native of Florida, and the rest inhabit the Mediterranean region. Flowers whorled; calyx five-toothed or very obscurely bilabiate; corolla tube equalling the calyx or bracteoles, the limb bilabiate; stamens four, distant. Leaves small, entire, often fascicled; floral and cauline ones conformed, or the uppermost ones reduced to small bracts. Several species have been introduced, but only two call for notice here. The leaves of both are employed, like other sweet herbs, for seasoning, in cookery. "Both species were noticed by Virgil as being among the most fragrant of herbs, and on this account were recommended to be grown near bee-hives. Vinegar, flavoured with Savory and other aromatic herbs, was as much used by the ancient Romans as Mint-sauce is at the present day with us" (Lindley and Moore).

S. hortensis (garden). Summer Savory. *fl.* pale lilac, small, axillary, on short pedicels; common peduncle sometimes three-flowered. July. *l.* oblong-linear, acute, shortly narrowed at base into the petioles. *h.* 6in. or rather more. South Europe, 1562. A pubescent annual. *See also* **Savory, Summer.**

S. montana (mountain). Winter Savory. *fl.* very pale purple; cymes shortly pedunculate, approximating in a spike or raceme. June. *l.* oblong, linear, and acute, or the lower ones spathulate or cuneate and obtuse. Stems woody at base, diffuse, much branched. South Europe, 1562. A glabrous or scabrous-pubescent under-shrub. (S. F. G. 543.) *See also* **Savory, Winter.**

SATYRIUM (*Satyrion* was the name given by Dioscorides to one of the Orchids, from *saturos,* a satyr; alluding to supposed aphrodisiacal properties). SYN. *Diplecthrum.* ORD. *Orchideæ.* A rather large genus (nearly fifty species have been described) of stove, greenhouse, or half-hardy, terrestrial, tuberous-rooted orchids, inhabiting the East Indies, the Mascarene Islands, and, for the most part, Southern and tropical Africa. Flowers mediocre or rather large, rarely small, in dense spikes; sepals and petals free, much spreading or reflexed; lip sessile at the base of the column, broad, concave, galeate, or cucullate, undivided, double-spurred, or bisaccate; bracts membranous or somewhat leafy. Leaves few on the lower part of the stem, rarely many at the sides of a tall stem. Tuber undivided. The species in cultivation are described below. Most of them will succeed admirably in a cold frame, in a compost of turfy peat, fibry loam, and sand, with plenty of drainage. *S. ciliatum* and *S. nepalense* thrive under similar treatment as regards compost, but require a greenhouse temperature. Propagation may be effected by division of the roots, made as fresh growth is commencing. Except where otherwise indicated, the under-mentioned species are South African.

S. aureum (golden).* *fl.* deep orange-colour, shaded with rich crimson. July and August, and continuing in perfection a long time. *h.* 1ft. or more. 1842. A fine plant. (P. M. B. xv. 31.)

S. candidum (white). *fl.* white, very sweetly aromatic; sepals linear, spreading; petals smaller, ascending, recurved at apex; lip inflated, obtuse. September. *l.* twin, somewhat roundish-ovate, glabrous. *h.* sometimes 1½ft. 1836.

S. carneum (flesh-coloured). *fl.* white, suffused with flesh-colour, large; sepals obtuse; petals inequilateral; lip galeate, apiculate, reflexed; bracts rose-margined. June. *l.* radical, twin, orbicular, fleshy; sheaths leafy, cucullate. *h.* 1½ft. 1797. (B. M. 1512; F. d. S. 329.)

S. ciliatum (ciliated). *fl.* pinkish-white; sepals linear, narrower than the petals, ciliated; lip galeate, the spurs very short; bracts very long, leafy; spike oval, imbricated. August. *l.* ovate-lanceolate, erect. Himalayas, 1880.

S. corifolium (leathery-leaved).* *fl.* yellow; sepals and petals linear, obtuse, glabrous, shorter than the orbicular lip; spur cylindrical, obtuse, bearded within; bracts ovate, reflexed; spike few-flowered. October. *l.* oblong-lanceolate, acute, spreading, slightly scabrous on the margins. *h.* 1ft. 1820. (B. M. 2172; B. R. 703; S. B. F. G. ii. 3; L. B. C. 104, under name of *S. cucullatum.*)

Satyrium—*continued.*

S. cucullatum (hooded). *fl.* green, with an unpleasant odour; intermediate sepal longer than the petals, linear, obtuse, lateral ones larger, all connate at base; lip acute, fleshy; spurs pendulous; bracts concave, reflexed. June. *l.* twin, orbicular, scabrous-ciliated; sheaths inflated, distant, furfuraceous-ciliated. *h.* 9in. 1786. (B. R. 416.) SYN. *Orchis bicornis* (A. B. R. 315).

S. erectum (erect). *fl.* of a yellowish-orange or pale purple colour; sepals and petals scarcely longer than the galeate lip; spurs filiform; bracts concave, reflexed, longer than the flowers; spike many-flowered. February. *l.* oblong, obtuse, coriaceous, with cartilaginous margins, scabrous, much-spreading, changing to convolute, imbricated sheaths. Stem 1½ft. to 2ft. high, wholly sheathed. 1838. (B. 117.) SYN. *S. pustulatum* (B. R. 1840, 18).

S. foliosum (leafy). *fl.* pale purplish, small, erect; lateral sepals spreading, the middle one decurved; petals obtuse, sub-erect; galea hemispherical, longer than the filiform spurs; bracts longer than the flowers; spike dense, obtuse, imbricated. July. *l.* oblong-lanceolate, erect, cucullate, imbricated, nearly as long as the stem. Stem 1ft. to 1½ft. high, leafy. 1828.

S. nepalense (Nepaul).* *fl.* rose-pink, fragrant; lateral sepals oblong, middle one and petals linear; lip galeate, apiculate; spurs filiform; bracts reflexed, as long as the flowers; spike oblong, loose, many-flowered. *l.*, radical ones ovate or lanceolate, erect; cauline ones shorter, spreading, sheathing at base. *h.* 1ft. or more. East Indies, 1882. (B. M. 6625.)

S. pustulatum (pustular). A synonym of *S. erectum.*

SAUCERS. Occasionally, these are useful for standing plants in, while they are in rooms or in places where water cannot readily be applied. Generally, plants are soon injured by standing in Saucers of water, as the soil becomes sour; but those which naturally require plenty of moisture, or grow in water, may be so treated with safety. Saucers are made to suit all the smaller sizes of flower-pots, and may be procured, in most instances, from the same pottery. For preserving a tender plant against the attack of slugs, &c., it is sometimes an effectual plan to place an inverted pot in the middle of a Saucer of water, and stand the plant on the top of it. Glazed Saucers may be recommended for rooms, as they do not allow moisture to pass through and injure anything on which they may be stood.

SAUNDERSIA (named after W. W. Saunders, 1809-1879, an ardent collector and cultivator of rare and curious plants). ORD. *Orchideæ.* A monotypic genus. The species is a stove, epiphytal orchid. For culture, *see* **Epidendrum.**

S. mirabilis (wonderful). *fl.* greenish-white, flushed with yellow and purple, medium-sized; sepals and petals free above, sub-equal, spreading, ovate; lip shortly connate with the column towards the base, the claw exceeding the sepals, the blade bilobed; column short; pollen masses two; scape short, recurved, sub-fasciculately many-flowered; bracts ovate. *l.* oblong, fleshy-coriaceous. Stem very short, one-leaved, scarcely or not at all pseudo-bulbous. Brazil. (R. X. O. 177.)

SAURAUJA (from *Sauraujo*, the name of a Portuguese botanist known to Willdenow). SYNS. *Blumia, Marumia, Palava* (of Ruiz and Pavon), *Reinwardtia* (of Blume). ORD. *Ternströmiaceæ.* A genus comprising about sixty species of mostly stove trees or shrubs, usually strigose-pilose or hairy, inhabiting Asia or tropical and sub-tropical America. Flowers usually hermaphrodite; sepals five, closely imbricated; petals five, imbricated, connate or rarely nearly free at base; stamens numerous, adhering to the base of the corolla; peduncles axillary or lateral, many-flowered, sub-paniculate, or rarely shortened and few-flowered. Leaves usually serrated. The under-mentioned species merit culture on account of their fine flowers and leaves. All are stove shrubs, thriving in a compost of loam and peat. Propagated by ripened cuttings, inserted in sand, under a glass, in heat.

S. excelsa (tall). *fl.* white; peduncles long, covered with brown hairs, trichotomously panicled at the apex. June. *l.* oblong-obovate, rather acute, quite entire, scabrous above, hairy beneath at the veins. *h.* 10ft. Caraccas, 1820.

S. nepaulensis (Nepaul). *fl.* white; racemes many-flowered, panicled, on long peduncles. August. *l.* lanceolate, 9in. long, 2in. to 3in. wide, acuminate, serrate, smooth above, beneath (as well as the branchlets) covered with brown down. *h.* 6ft. Nepaul, 1824.

Sauraujа—*continued.*

S. spectabilis (remarkable). *fl.* white, in ample, much-branched panicles; petals obcordate, twice exceeding the calyx. June. *l.* obovate-lanceolate, shortly acuminate, connate at base, petiolate, doubly serrate, naked in the axils of the veins. Branches, peduncles, calyces, and nerves of leaves, adpressedly ferruginous-bristly. *h.* 10ft. Brazil, 1842. (B. M. 3982.)

SAUROGLOSSUM. Included under **Spiranthes** (which *see*).

SAUROMATUM (from *saura*, a lizard; alluding to the speckled interior of the spathe). ORD. *Aroideæ* (*Araceæ*). A genus consisting of about half-a-dozen species of stove, tuberous-rooted, herbaceous perennials, natives of tropical Asia and Africa. Flowers on a long, appendiculate spadix, shorter than the spathe, males and females remote; spathe marcescent, at length vanishing, the tube ventricose, the margins more or less connate, the throat opening, the lamina lanceolate, elongated. Leaves solitary, pedately parted; petioles elongated, terete. The introduced species are here described. They thrive in a compost of light loam and peat, in equal proportions. Propagated by offsets.

S. guttatum (spotted). *fl.*, spathe tube green outside, oblong, the lamina olive outside and yellowish-green within, with rather large, irregular, dark purple spots; spadix terete-conical; peduncle short. May. *l.*, segments oblong or oblong-lanceolate, acuminate; petioles unspotted. *h.* 1½ft. Himalayas, 1830. (B. R. 1017, under name of *Arum venosum.*)

S. pedatum (pedate-leaved). *fl.*, spathe tube dark purple within, loosely constricted above the middle, the lamina narrow-elongated, yellowish, with very dense, confluent, purple spots. March. *l.* pedatisect; segments seven, nine, or eleven, obovate-oblong, acute, very shortly or scarcely acuminate, obtuse at base; petioles long. *h.* 3ft. East Indies, 1815. (R. G. 495.)

S. punctatum (dotted). *fl.*, spathe green, marked with brown spots; peduncle short. *l.* trifoliolate; middle leaflet solitary, elliptic, long-acuminate; lateral ones pedately seven-parted, the outer segments smaller. *h.* 1ft. Himalaya (?), 1858.

S. venosum (veined).* *fl.*, spathe purplish outside, the tube oblong, the lamina yellowish within, with crowded, small, oblong, purple spots; spadix appendix very long, cylindrical; peduncle very short, violet-spotted. *l.*, segments oblong, cuneate towards the base, acuminate at apex, the midrib and lateral nerves yellowish; petioles spotted. *h.* 1ft. East Indies, 1848. (B. M. 4465; F. d. S. 1334; L. J. F. 12, under name of *S. guttatum.*)

SAUROPUS (from *sauros*, a lizard, and *pous*, a foot; Blume, the originator of the genus, does not say why it is so named). SYN. *Ceratogynum.* ORD. *Euphorbiaceæ.* A genus comprising about fourteen species of stove shrubs, with the habit of *Phyllanthus*, natives of the East Indies, the Malayan Archipelago (and New Caledonia ?). Flowers fascicled in the axils, all pedicellate, the males minute, the females in the same or in a distinct axil, solitary or rarely two. Leaves alternate, distichous, membranous, entire. For culture of *S. albicans Gardnerianus*, the only species introduced, *see* **Phyllanthus.**

S. albicans Gardnerianus (whitish, Gardner's) *l.* oblong-ovate, scarcely rounded-obtuse or sub-obtuse at base, acute and acuminate at apex, small, deep green, with a greyish central blotch. Branches and branchlets slender, green, the latter angular. Ceylon, 1861.

SAURUREÆ. A tribe of *Piperaceæ.*

SAURURUS (from *sauros*, a lizard, and *oura*, a tail; alluding to the form of the inflorescence). Lizard's Tail. SYNS. *Anonymo, Mattuschkia, Spathium.* TRIBE *Saurureæ* of ORD. *Piperaceæ.* A small genus (two species) of hardy, aquatic, perennial herbs; one is a native of Eastern Asia, and the other North American. Flowers small, numerous, in a terminal raceme, each with a small bract; perianth wanting; stamens six or eight, or fewer by abortion. Fruit sub-globose. Leaves alternate, broad, cordate; stipules membranous, adnate to the petioles. The plants should be grown in sandy loam, in a pond or cistern. They may be increased by seeds, or by divisions.

S. cernuus (drooping). American Swamp Lily. *fl.* white, in a dense spike, 4in. to 6in. long, nodding at the end; bracts

Saururus—*continued.*

lanceolate; filaments long and capillary. June to August. *l.* cordate, acuminate, converging-ribbed, without distinct stipules. Stem 1ft. to 2ft. high. North America, 1759.

S. chinensis (Chinese). A synonym of *S. Loureiri.*

S. Loureiri (Loureiro's). This is closely allied to *S. cernuus*, but may be distinguished by the following characters: filaments very short; spike equalling the leaves; stem very angular. Eastern Asia, 1819. (R. G. 756.) SYN. *S. chinensis.*

FIG. 421. FLOWERING BRANCH OF SAUVAGESIA ERECTA.

SAUSSUREA (named after the Swiss philosopher Horace Benedict de Saussure, 1740-1799, who possessed a considerable knowledge of botany). Sawwort. SYNS. *Bennetia*, *Heterotrichum* (of Bieberstein). Including *Aplotaxis* and *Frolovia*. ORD. *Compositæ*. A genus comprising about sixty species of hardy, glabrous or white-tomentose, perennial herbs, mostly found on mountains in Europe, Asia, and North America. Flower-heads purplish or bluish, sometimes narrow and corymbose, sometimes broader and pedunculate, solitary or loosely paniculate; involucre ovoid, oblong or globose, with many series of closely imbricated bracts, the outer ones elongated; receptacle flat or convex, densely bristly-paleaceous or rarely naked; rays sometimes deeply five-fid; achenes glabrous; pappus bristles in one or two series. Leaves alternate, entire, toothed, or pinnatifid, the teeth or lobes unarmed. The species are not very ornamental. A selection of those introduced is given below. They thrive in ordinary garden soil, and may be increased by seeds.

S. albescens (whitish). *fl.-heads* purple; involucre oblong, slightly hoary, the scales very acuminate; corymbs compound, many-headed. July. *l.* white-tomentose beneath; cauline ones sessile, oval, obtuse, sub-entire. *h.* 2ft. Nepaul, 1837. SYN. *Aplotaxis albescens.*

S. alpina (alpine). *fl.-heads* purple, 2in. to 3in. in diameter; involucre ovoid, with obtuse, woolly bracts; corymbs dense. August. *l.* oblong-lanceolate, toothed, cottony beneath; lower ones petioled, 4in. to 7in. long, acuminate; upper ones smaller, sessile. Stem simple, 6in. to 8in. high, stout, erect, leafy. Europe (Britain), &c. (Sy. En. B. 703.)

S. elegans (elegant). *fl.-heads* pink, corymbose; involucre subcylindrical, hoary-villous, the outer scales ovate, the inner ones oblong. July. *l.* slightly scabrous above, cobwebby-tomentose beneath; lower ones lyrately pinnatifid or toothed; upper ones oblong, nearly entire, acuminate at both ends. *h.* 2ft. Caucasus, 1820.

S. pulchella (pretty).* *fl.-heads* purple, globose, corymbose; outer involucral scales tomentose, inner ones coloured. July. *l.* slightly scabrous, pinnatifid; segments linear-acute, slightly toothed; cauline leaves sub-decurrent, the uppermost ones undivided. *h.* 2ft. Siberia, &c., 1835. (B. R. xxviii. 18; B. M. 2589, under name of *Serratula pulchella.*)

Saussurea—*continued.*

S. pygmæa (dwarf). *fl.-heads* purple; involucral scales slightly hairy, all acuminated. July. *l.* mostly clustered, sessile, linear, sub-entire, with revolute margins, slightly hairy beneath. Stems dwarf, sparsely leafy, one-headed. *h.* 1ft. Eastern Europe, 1816. (J. F. A. 440, under name of *Serratula pygmæa.*)

SAUSSUREA (of Salisbury). A synonym of *Funkia.*

SAUSSURIA (of Mœnch). A synonym of **Nepeta** (which *see*).

SAUVAGESIA (named after Francis Bossier de Sauvages, 1706-1767, Professor of Botany at Montpelier, and a friend and correspondent of Linnæus). ORD. *Violarieæ*. A genus containing about ten species of stove, highly glabrous herbs or sub-shrubs, all tropical American. Flowers white, pink, or violet, axillary or disposed in terminal racemes; sepals sub-equal; petals equal, convolute. Leaves alternate, rather rigid, entire or serrulated; stipules pectinate-ciliated. The species introduced is a charming little annual. Seeds should be thinly sown, during March, in pots of loam and peat, and the young plants treated as other stove annuals.

S. erecta (erect). Iron Shrub; St. Martin's Herb. *fl.* pink or purple-red; sepals aristate-acuminate; petals obovate, apiculate. May to October. *l.* lanceolate, serrated. Stem branched, procumbent or erect. *h.* 6in. Mexico, 1824. See Fig. 421. SYN. *S. geminiflora.*

S. geminiflora (twin-flowered). A synonym of *S. erecta.*

SAUVAGESIEÆ. A tribe of *Violarieæ.*

SAVANNAH FLOWER. A name applied to *Echites suberecta*, and other species.

SAVASTANA. A synonym of **Hierochloe** (which *see*).

SAVIN-TREE. *See* **Juniperus Sabina.**

SAVORY, SUMMER (*Satureia hortensis*). A hardy annual, native of Southern Europe, cultivated for its aromatic tops, which are used, in culinary preparations, for flavouring and seasoning. It is raised from seeds, which should be sown early in April, in shallow drills, about 1ft. apart. Select a sunny situation, and thin out the seedlings, when large enough, to 6in. asunder in the rows. When the plants are in flower, they may be pulled up, tied in bundles, and dried for winter use.

SAVORY, WINTER (*Satureia montana*). A dwarf, hardy, evergreen under-shrub, also a native of Southern Europe, and grown for the same purposes as Summer Savory. It may be raised from seeds, sown at a similar period, and in the same way; also from cuttings and divisions. Cuttings formed of young side shoots, with a heel attached, may be readily rooted under a hand glass, or in a shady border outside. Divisions should be made in March or April, and plants obtained in this way, or from cuttings, should be permanently inserted in rows, at distances of about 1ft. apart, during a showery period, at the latter part of summer.

SAVOURY AKEE-TREE. *See* **Cupania sapida.**

SAVOY CABBAGE. *See* **Brassica oleracea bullata major** and **Cabbage.**

SAWDUST. This is occasionally used as a manure; but it decays so slowly that it is little esteemed for this purpose. Applied in considerable quantity, it has been found to produce little effect the first year; but each succeeding year the crop was increased, till it reached its maximum in the fourth year. Sawdust should be made up into a compost with farmyard manure, earth, and other materials; and the value of the compost is much increased by saturation with liquid manures, gas-liquor, or other fluids containing ammonia. The manurial value of Sawdust is considerably greater when it is well decayed than while it is fresh; but the material can be recommended as manure only when there are accumulations of it to be disposed of.

SAWFLIES (*Tenthredinidæ*). A large section of *Hymenoptera* (*see* **Insects**), characterised by the females possessing an organ adapted to cut through the skin of

FIG. 422. LARVÆ OF ROSE-LEAF SAWFLY.

leaves and of branches, so as to permit of eggs being placed in the slits. This organ resembles a minute double saw (whence the popular name of the insects), and is toothed so as to serve as one, but the details of the toothing vary with the species. The larvæ of all feed on plants. Most of them greatly resemble the larvæ of Butterflies and Moths, except in having from eighteen to twenty-two claspers or prolegs. Nearly all the larvæ feed on leaves, exposed on the surfaces or the edges of the latter; but some burrow between the surfaces of the leaves (*e.g.*, *Fenusa Ulmi*), and others live protected in the interior of fleshy pea-shaped or bean-shaped galls on the leaves (*e.g.*, *Nematus gallicola*), or swellings in the branches, of Willows. When full grown, most of them go underground, spin cocoons there, and in them become pupæ. Some (*e.g.*, *Trichiosoma lucorum* and *Lyda*) fix their cocoons to branches of the food-plants, or spin up among dead leaves or rubbish. The larvæ of the Rose-leaf Sawfly (see Fig. 422), and of the Gooseberry and Currant Sawfly (see Fig. 423), are good types of Sawfly larvæ.

FIG. 423. LARVA OF GOOSEBERRY AND CURRANT SAWFLY (*Nematus Ribesii*).

In like manner, the Gooseberry and Currant Sawfly (*Nematus Ribesii*, see Fig. 424) is a good type of a large majority of the mature Sawflies.

Sawflies are mostly sluggish and heavy in their movements, even on the wing. The head is usually broad; and there is no narrowed foot-stalk between the thorax and the abdomen. The colours are very generally black, yellow, or brown on the body and limbs; the wings are almost always transparent, and are of the form shown in Fig. 424. The largest Sawflies in Britain are about as large as a small Humble Bee, but most are of small size.

Many species are very harmful to cultivated plants; and references will be found to the worst under **Gooseberry and Currant Sawfly, Lophyrus, Lyda, Nematus, Pear** (INSECTS), **Rose Sawflies, Slugworms,** and **Turnip Sawfly.** Among the plants that suffer most are

Sawflies—*continued.*

Coniferæ, Currants and Gooseberries, Hawthorns, Roses, fruit-trees, Willows, and Turnips; but few plants altogether escape injury. Certain species of Sawflies, injurious to cultivated produce, feed exposed on the plants, and may be hand-picked; or, if very numerous, and if circumstances permit, they may be destroyed by watering the plants with infusions of powder of Hellebore, or of Paris Green. Social larvæ, as in the genus *Lyda*, which spin a common web, may be removed and destroyed with the web. For further information, *see* the headings just quoted.

SAW PALMETTO. *See* **Serenoa serrulata.**

SAWS. Instruments in frequent demand for various purposes in gardens. An ordinary Saw, with the teeth set rather wide, answers well for sawing wood, cutting down trees, &c. In addition, a cross-cut Saw should be at command, as it is occasionally necessary to cut down branches or trees that are too large for severing without an instrument of this description. Pruning Saws, for removing branches or spurs in ordinary pruning, are invaluable for their purpose; they are small, and carried to a point, something like those used for turning or cutting circular holes in boards. It is most important that Saws of every kind should be kept clean and in a dry place, when not in use. It is a good plan to rub a little sweet oil over the blades, in order to prevent them from rusting.

FIG. 424. GOOSEBERRY AND CURRANT SAWFLY (*Nematus Ribesii*) *a*, Lines to show actual spread of wings and length of body.

SAW-WORT. A common name for certain species of *Saussurea* and *Serratula*.

SAXEGOTHEA (named in honour of his late Royal Highness Prince Albert). SYN. *Squamataxus*. ORD. *Coniferæ*. A monotypic genus. The species is a half-hardy, evergreen tree. For culture, *see* **Taxus.**

S. conspicua (conspicuous). Prince Albert's Yew. *fl.*, male catkins in terminal spikes or racemes; females in spherical heads, in the form of a little cone, on long, slender, terminal foot-stalks, sometimes drooping. June. *fr.* composed of several consolidated, free scales, formed into a solid, fleshy, depressed cone. *l.* alternate and scattered, or somewhat in two rows on the branchlets, leathery, stiff, linear or oblong-lanceolate, somewhat falcate, slightly twisted and reflected, ½in. to 1½in. long, convex above, shortly petiolate, acute. *h.* 30ft. Southern Chili, 1846. (J. H. S. vi. 258.)

SAXIFRAGA (an old Latin name used by Pliny, and derived from *saxum*, a rock, and *frango*, to break; so called because it was supposed to break stones in the

Saxifraga—*continued.*

bladder). Breakstone; Rockfoil; Saxifrage. Including *Ciliaria*, *Hirculus*, *Megasea*, *Miscopetalum*, *Muscaria*, *Robertsonia*, *Spatularia* (of Haworth). ORD. *Saxifrageæ*. A large genus of mostly hardy, perennial, rarely annual, highly glabrous, pilose, or glandular, erect or decumbent herbs, natives of the North and South temperate and Arctic zones, rarely found in Asia, and very rare in South America; absent from Australia, South Africa, and the Pacific. Flowers white or yellow, rarely purple or rose, paniculate or corymbose; calyx tube short or elongated, free or adnate at the base with the ovary; lobes five, erect or spreading, imbricated; petals five, equal or rarely unequal, sometimes fimbriated or gland-bearing at base, perigynous or sub-hypogynous; stamens ten, rarely five, inserted with the petals. Leaves variable; radical ones frequently rosulate; cauline ones generally alternate; petioles sheathing at base. A dozen species are indigenous to Britain. The best-known species are described below; all, except where otherwise stated, are hardy perennials. With few exceptions, Saxifragas are amongst the easiest of plants to cultivate, they may be grown in any open soil, and generally prefer to be surrounded with stones. Propagated readily by offsets or by division of the tufts. Great variation is represented in the habits of the numerous species. They are nearly all beautiful and interesting subjects.

FIG. 425. SAXIFRAGA CÆSIA, showing Habit and detached Rosette of Leaves.

S. adscendens (ascending). *fl.* white; calyx and peduncles hispid; petals obovate, retuse. April. *l.* fleshy, three-lobed; radical ones cordate, on rather long petioles, with the lobes incised; cauline ones somewhat cuneiform, the uppermost entire. *h.* 3in. North America, &c., 1732. Annual. SYN. *S. petræa* (B. M. 3026).

S. adscendens (ascending), of Vahl. A synonym of *S. aquatica*.

S. aizoides (Aizoon-like).* *fl.* orange or golden-yellow, dotted with red, ½in. in diameter; petals distant. June and July. *l.* linear-oblong, crowded below, scattered on the flowering stems, ½in. to 2in. long, spreading; lower ones reflexed, often ciliated. Stems decumbent, tufted, much-branched; branches 3in. to 8in. long. Alpine and Arctic Europe (Britain). (Sy. En. B. 551.)

S. Aizoon (Aizoon). *fl.*, petals cream-colour, often spotted at the base, obovate; scape many-flowered, erect, clammy-pubescent. June. *l.* clustered at the root, persistent, thick, spathulate, with white, cartilaginous, toothed margins. *h.* 5in. to 10in. Europe, North America, 1731. *minor* is a smaller form. SYN. *S. intacta*.

S. Andrewsii (Andrews'). *fl.*, petals white, dotted with purple above the middle, oblong. Summer. *l.* rather thick, sparsely hairy; basal ones spathulate, nearly lingulate, flat, cuneate-

Saxifraga—*continued.*

attenuated, very obtuse, minutely crenate-serrated; cauline ones oblong, serrated. Stems erect, glandular-hairy, few-leaved; branches racemose. *h.* 6in. 1848. A hybrid between *S. Geum* and *S. Aizoon*.

S. aquatica (aquatic). *fl.* white, large, shortly pedicellate; calyx segments ovate-lanceolate, longer than the tube; petals obovate-oblong, more than twice the length of the calyx; inflorescence loose below, crowded above. July and August. *l.* fleshy, sparsely pilose, dilated at base; cauline ones sessile, incised-trilobed above the middle. Stems simple or racemose-paniculate from the base. *h.* 1ft. to 1½ft. Pyrenees. (R. G. 1167.) SYN. *S. adscendens* (of Vahl).

S. aretioides (Aretia-like).* *fl.*, petals golden-yellow, crenulate, with several straight nerves; corymb dense, few-flowered; peduncles clothed with clammy down. May to July. *l.* aggregate, linear-ligulate, upright, mucronulate, keeled, glaucous, with cartilaginous margins. *h.* 2in. Pyrenees, 1826. (B. M. 5849.)

S. bronchialis (bronchial). *fl.* cream-coloured; calyx segments oblong-lanceolate, glabrous; petals oblong, twice as long as the calyx; pedicels glandular, erecto-patent. May. *l.* rather rigid, linear-lanceolate, mucronulate at apex, the margins ciliated or ciliate-spinulose. Stems ascending, densely leafy at base; floriferous ones paniculate above. *h.* 6in. North America, 1819. SYN. *S. densa*.

S. Burseriana (Burser's).* *fl.* milk-coloured, large and beautiful, lined with yellowish nerves; petals roundish, with curled edges. March to June. *l.* rosulate, triquetrous, pungent, smooth, glaucous. Stems usually one-flowered. *h.* 1½in. Alps, 1826. Plant densely tufted. (Gn., Sept. 17, 1877.)

S. B. major (larger).* *fl.* white, solitary, on peduncles about 2in. high. *l.* acute, ciliated, in small, dense rosettes. 1884. A beautiful little rockwork plant. (G. C. n. s., xxi. p. 141.)

S. cæsia (grey).* *fl.* milk-coloured, disposed in a small panicle; petals roundish, unguiculate. May and June. *l.* linear-oblong, aggregate, recurved, keeled, the upper surface with marginal dots regularly disposed; cauline ones few. Stems (and peduncles) smoothish. *h.* 1½in. to 3in. Alps, 1752. See Fig. 425. (J. F. A. 374; L. B. C. 421.)

S. cæspitosa (tufted).* *fl.* white, campanulate, few, small, crowded. July and August. *l.* cuneate, three to five-lobed; lobes sub-parallel, obtuse; upper cauline leaves undivided. *h.* 3in. Europe (Britain). Plant densely tufted, with short, flowerless shoots. (Sy. En. B. 556.)

FIG. 426. SAXIFRAGA CAMPOSII.

S. Camposii (Don Pedro del Campo's).* *fl.* white, ¾in. in diameter, corymbose, inclined; petals spathulate, twice as long as the stamens. May. *l.* very variable, ½in. to ¾in. in diameter, flabellately three to five-cleft, with simple, obtuse or sub-acute teeth, or broader and deeply three to five-lobed, with the lobes three or more toothed; petioles ½in. to 1in. long. *h.* 3in. to 6in. Spain, &c., 1882. See Fig. 426. (B. M. 6640.) SYN. *S. Wallacei* (of gardens).

S. ceratophylla (horn-leaved). A synonym of *S. trifurcata*.

S. cernua (drooping). *fl.* white, ½in. to ¾in. in diameter, drooping; calyx lobes erect, obtuse; petals obovate. July. *l.* petioled, reniform, palmately deeply crenate or lobulate; radical ones ½in. to ¾in. in diameter, often tinged with red; cauline ones sessile,

Saxifraga—*continued.*

with axillary, scarlet buds. Stem erect, simple, one to three-flowered. *h.* 2in. to 6in. Europe (Britain), America, &c. The flowers are rarely produced in this country. (Sy. En. B. 554.)

S. ciliata (ciliated). A variety of *S. ligulata.*

S. cordifolia (heart-shape-leaved). *fl.* red, large; petals roundish. March to May. *l.* orbicularly cordate, serrated, glabrous. *h.* 1ft. Siberia, 1779.

S. cortusæfolia (Cortusa-leaved).* *fl.* white, unspotted, on slender pedicels; petals linear, the one to three longer ones ½in. to ¾in. long; scape stout, bearing an open panicle often 7in. to 8in. long. October. *l.* on stout petioles, orbicular, cordate or sub-reniform at base, 2in. to 3in. in diameter, shallowly five to many-lobed, bright green above, fading to bright red-brown or red. Japan, 1883. Plant stemless, probably very variable. (B. M. 6680.)

FIG. 427. SAXIFRAGA COTYLEDON, showing Habit, and detached Flower and Leaf.

S. Cotyledon (Cotyledon).* *fl.* white, dotless, large; calyx densely glandular; petals conspicuously three-nerved, oblong-spathulate. May to July. *l.* flat, spathulate, cartilaginously serrated, the edges silvery. Stem erect, branched in a pyramidal form, many-flowered. *h.* 1ft. to 2ft. Alps, 1596. Plant tufted. See Fig. 427. (F. d. S. 1443.) *S. neyalensis* (of gardens) and *S. pyramidalis* are simply robust forms of this species.

S. crassifolia (thick-leaved).* *fl.* red, large, disposed in thyrsoid panicles; petals elliptic-oblong. March to May. *l.* large, fleshy, oval or obovate, very blunt, glabrous, serrulated. Root thick and woody. *h.* 1ft. Siberia, 1765. See Fig. 428. (B. M. 196.)

S. cuscutæformis (Cuscuta-like). *fl.* white; calyx very short, spreading; petals very shortly clawed, lanceolate-elliptic; panicle branches two or three-flowered; scape slender, ascending, loosely secund-paniculate below the middle. June and July. *l.*, basal ones rather thick, sub-orbicular or ovate, deeply or undulately toothed. *h.* 6in. Japan, 1815. (B. M. 2631; L. B. C. 186.)

S. Cymbalaria (Cymbalaria). *fl.* citron-yellow; petals cordate at base, distinctly unguiculate, thrice as long as the calyx segments. May to August. *l.* brown-striated; lower ones nearly twice as long as the petioles, reniform, seven to eleven-lobed, the middle lobe largest; upper ones shortly petiolate, five to seven-lobed. Stems nearly erect, or more or less flexuous, branched. Himalayas, &c.

S. decipiens (deceptive). *fl.*, calyx lobes ovate, obtuse, as long as the tube. *l.* of all the shoots rosulate, three to seven-cleft; lobes abruptly acuminate. This is regarded by Hooker as a sub-species of *S. hypnoides.* (L. B. C. 1510; Sy. En. B. 557.) *gemmifera* (Sy. En. B. 562) and *platypetala* (Sy. En. B. 561) are varieties.

S. densa (dense). A synonym of *S. bronchialis.*

S. diapensioides (Diapensia-like). *fl.* white, three, four, or five, campanulate, disposed in a terminal head; petals narrow at the base, the limb orbicular. April to June. *l.* linear, erect, keeled, aggregate, imbricated, cretaceously glaucous, cartilaginous on the margins, ciliated at base, and with one or two perforated dots at the obtuse apex. Stem many-leaved, few-flowered. *h.* 1½in. Alps, 1825. Plant densely tufted.

Saxifraga—*continued.*

S. diversifolia (variable-leaved).* *fl.* yellow, obscurely spotted, ½in. to ¾in. in diameter, pedicellate, erect; petals twice as long as the sepals, spreading and recurved; corymb few or many-branched and flowered, the branches erecto-patent. July. *l.*, radical ones long-stalked, 1in. to 2in. long, ovate or cordate, acute; cauline ones sometimes very numerous, smaller, sessile, semi-amplexicaul. Stem erect, 6in. to 16in. high, simple or corymbosely branched above. India, &c., 1882. (B. M. 6503.)

S. elongata (elongated). A form of *S. virginiensis.*

S. flagellaris (whip-like). *fl.* yellow; petals permanent. May to July. *l.*, radical and lower cauline ones obovate-spathulate upper ones rather villous. Stems erect, simple, one to five-flowered, and (as well as the calyces) glandular-pubescent. Stolons or flagellæ filiform. *h.* 3in. Caucasus, &c., 1819. (B. M. 4621; L. J. F. 237.)

S. florulenta (slow-flowering). *fl.* pale lilac, ½in. long, slightly nodding; petals twice as long as the calyx lobes, spathulate, obtuse; panicle narrow, thyrsoid, 5in. to 12in. high, more or less densely hairy. Rarely produced. *l.* ¾in. to 2in. long, innermost ones the shortest, very numerous, densely imbricated, spathulate, mucronate, bristly-ciliate below. Rosettes 5in. to 7in. in diameter. Maritime Alps. "A striking species, but exceedingly difficult to grow. It probably lives to a great age before flowering, after which it dies" (Hooker). (B. M. 6102; R. G. 782.)

S. Fortunei (Fortune's).* *fl.* white, disposed in an erect, many-flowered panicle; petals very unequal, one or more being elongated and saw-edged. *l.* reniform-cordate, lobed and laciniately toothed. Japan, 1863. A pretty, half-hardy perennial, with the habit of *S. cortusæfolia.* See Fig. 429. (B. M. 5377; F. M. 221.)

FIG. 428. SAXIFRAGA CRASSIFOLIA.

S. geranioides (Geranium-like). *fl.* white, numerous, sub-corymbose; calyx segments erect, longer than the tube; petals obovate-oblong, long-clawed, about twice as long as the calyx. July. *l.*, lower ones slightly pilose, sub-orbicular-reniform, palmately trifid, the lateral lobes bifid, entire or two or three-toothed; cauline ones cuneate-ovate, with narrow lobes. Stems numerous, slightly woody. *h.* 6in. Pyrenees, 1770. (R. G. 989.)

S. Geum (Geum). *l.* orbicular, more or less reniform or cordate, crenate or toothed, on slender petioles. According to Hooker, this is merely a sub-species of *S. umbrosa.* (Sy. En. B. 543-545.) *elegans* and *gracilis* are varieties.

S. granulata (granulate).* Fair Maids of France; First of May; Meadow Saxifrage. *fl.* white, inclined or drooping, campanulate, 1in. in diameter; petals obovate. April and May. *l.* petioled, reniform, palmately lobulate; radical ones ¾in. to 1¼in. in diameter, on slender petioles; cauline ones sessile, deeper and more acutely cut. Stem 6in. to 18in. high, erect, bulbiferous at base, branched and many-flowered above. Europe (Britain), &c. (Sy. En. B. 555.) There is a pretty double form of this species in cultivation.

S. Guthrieana (Guthrie's). A hybrid, very similar to, or identical with, *S. Andrewsii.*

S. hieracifolia (Hieracium-leaved). *fl.* white; petals ovate, acute; scape erect, racemose, the branches four to six-flowered

Saxifraga—*continued.*

June and July. *l.* nearly all basal, ovate-oblong or oblong, remotely repand-toothed, dilated at base, semi-amplexicaul, glabrous above, villous beneath and on the margins. *h.* 1ft. Europe, &c., 1789.

S. Hirculus (Hirculus).* *fl.* ½in. to ⅔in. in diameter, sub-solitary; sepals reflexed; petals obovate, dotted with red at the base, where there are two tubercles. August. *l.*, radical ones ½in. to 1in. long, rosulate, petioled, lanceolate or spathulate; cauline ones linear, sometimes faintly serrated. Stem sub-simple, erect, stoloniferous. *h.* 4in. to 8in. Arctic and Alpine Europe (Britain), &c. (Sy. En. B. 550.)

S. H. grandiflora (large-flowered). A fine variety, having flowers 1in. in diameter. (R. G. 1035, Fig. 4.)

S. hirsuta (hairy). *l.* long-petioled, broadly ovate, rounded at base or narrowed into the petiole; margins cartilaginous, sharply toothed or serrated. Plant more hairy than *S. umbrosa*, to which it is referred, by Hooker, as a sub-species. (Sy. En. B. 546.)

S. hirta (hairy). A sub-species of *S. hypnoides*.

S. Hostii (Host's).* *fl.* five to nine in a corymb; calyx segments ovate-triangular; petals white, or with a few purple dots above the middle, oblong or obovate-oblong; pedicels glandular. May. *l.*, basal ones numerous, ligulate, obtuse at apex, ciliated at base; cauline ones oblong, crenate-serrated. Stem erect, paniculate above. *h.* 6in. to 12in. South Europe.

S. hypnoides (Hypnum-like).* Dovedale Moss; Eve's Cushion, &c. *fl.* white, ½in. to 1in. in diameter, campanulate; flowering shoots 3in. to 18in. long, stout or slender. May to July. *l.* cuneate, three to five-cleft, loose or dense, with the broad, compressed petioles ½in. to 1in. long; lobes entire, or the lateral ones cleft, flat or channelled. Europe (Britain), &c. The tufts often form large cushions.

FIG. 429. SAXIFRAGA FORTUNEI, showing Habit and detached Flowers.

S. h. hirta (hairy). *fl.*, calyx lobes broad; petals obovate, flat. *l.* three-lobed; lobes linear, suddenly contracted beyond the middle, acute. (Sy. En. B. 559.) *affinis* (Sy. En. B. 560) and *incurvifolia* (Sy. En. B. 558) are varieties.

S. h. Sternbergii (Sternberg's). Barren shoots rather long, their leaves with three to five obtuse lobes. A robust variety.

S. imbricata (imbricated). *fl.* white, solitary, terminal; petals obovate, with attenuated claws, trinerved. June and July. *l.* small, hollowed, ovate-oblong, sub-triquetrous at apex, ciliate-serrulate on the margins. *h.* 3in. India, 1843. Plant very densely tufted.

S. intacta (intact). A synonym of *S. Aizoon*.

S. irrigua (watered). *fl.* white, large, campanulate; petals spathulate; panicle loose, many-flowered. June and July.

Saxifraga—*continued.*

l., radical ones palmately five-parted; cauline ones trifid, sessile; segments cuneate-oblong, mucronate, trifid. Stems beset with jointed hairs. *h.* 6in. to 12in. Tauria, 1817. (B. M. 2207.)

S. juniperifolia (Juniper-leaved). *fl.* yellow or greenish-yellow, racemose or spicate-capitate; petals slightly exceeding the calyx segments, oblong-spathulate. July. *l.*, those of the woody caudex rigid, erect, appressed, subulate, rather broader at base, rigidly mucronate; cauline ones long-ciliated at base. Stems leafy, villous. Caucasus, &c.

S. Kotschyi (Kotschy's). *fl.* yellow, in cymes terminating the short, leafy stems. *l.* small, closely imbricated, obovate-obtuse, apiculate. Asia Minor, 1873. A hardy or half-hardy, bluish-green plant, forming densely-tufted rosettes, ½in. to ¾in. across. (B. M. 6065.)

S. leucanthemifolia (Leucanthemum-leaved). *fl.* in a spreading, corymbose or paniculate cyme; petals white, lanceolate, unequal, the three larger ones with a heart-shaped base and a pair of spots; the two smaller ones with a tapering base and no spots. June. *l.* oblong, wedge-shaped or spathulate, coarsely toothed or cut, tapering into a petiole. *h.* 5in. to 18in. North America, 1812. (B. M. 2959; L. B. C. 1568.)

S. ligulata (strap-shaped).* *fl.* very pale red, almost white, in a dichotomous panicle; petals broad, orbicular. March to May. *l.* obovate, sub-cordate, denticulated, quite glabrous on both surfaces, but ciliated on the margins. *h.* 1ft. Nepaul, 1821. (B. M. 3406; H. E. F. 49; L. B. C. 747; S. B. F. G. 59.)

S. l. ciliata (ciliated). This practically only differs from the type in its somewhat smaller size, and in the leaves being hairy on both surfaces. Nepaul and Kumaon. (B. M. 4915, under name of *S. ciliata*.)

S. lingulata (tongue-shaped). *fl.* white, with numerous rose-coloured dots, flat; calyx densely glandular, as well as the peduncles; petals oval, conspicuously triple-nerved. May to July. *l.* linear-lingulate, channelled, tubercularly crenated, glaucous, ciliated at base, recurved at apex. Stem erect, flexuous, fastigiately branched. *h.* 1ft. to 1½ft. Alps, 1800.

S. l. cochlearis (spoon-like).* *fl.* white, in slender panicles; peduncles (as well as the branches) purplish-brown, glandular-pubescent. June. *l.* ½in. to 1in. long, spathulate, coriaceous, in tufted rosettes. Maritime Alps, 1883. (B. M. 6688.)

FIG. 430. SAXIFRAGA LONGIFOLIA.

S. longifolia (long-leaved).* *fl.* white, slightly dotted with red, disposed in a close, pyramidal thyrse, 1ft. high. July. *l.* linear-oblong, 6in. long, of thick substance, densely rosulate, having cartilaginous margins. Pyrenees, 1871. See Fig. 430. (B. M. 5889.)

S. marginata (margined). *fl.* white, ½in. in diameter, disposed in small, rather compact cymes. July. *l.* small, oblong, dotted on the margins with a series of lime incrustations, disposed in dense rosettes. Stem purplish, 2in. to 4in. high. Italy and Greece, 1883. (B. M. 6702.)

S. Maweana (Maw's).* *fl.* white, ¾in. in diameter, shortly pedicellate; peduncles erect, 4in. to 6in. long; petals obovate-spathulate, rounded at the tips. May and June. *l.* on flattened petioles, 1in. to 2½in. long; lower ones loosely rosulate, orbicular-reniform, three-cleft to the middle, or with the lateral lobes cleft;

Saxifraga—*continued.*

upper radical leaves cuneate, trifid, with pedicelled, thickened leaf-buds in their axils. Tetuan, 1827. A well-known and highly-prized rock plant. (B. M. 6384; G. C. 1871, p. 1355.)

S. media (intermediate). *fl.*, calyx and peduncle purplish, densely glandular; petals erect, obovate, three to five-nerved, scarcely exceeding the calyx segments; inflorescence cymose-paniculate or racemose. June and July. *l.*, basal ones imbricated, explanate-depressed, spathulate-lingulate, acute or obtuse; cauline ones spathulate, glabrous, except the apical part. Stems erect. *h.* 6in. to 8in. Pyrenees. (G. C. n. s., xxiii. 801; S. F. G. 376.)

S. moschata (musky).* *fl.* pale yellowish or purplish, one to ten, racemose or paniculate; petals spreading, oblong, scarcely exceeding the calyx segments. May and June. *l.* smooth, glabrous or glandular-pilose, entire, obtuse or cuneate, trifid, rarely five-fid with linear lobes, obtuse; cauline ones scattered, trilobed or entire. *h.* 3in. Pyrenees, &c., 1819. SYN. *S. muscoides.*

S. muscoides (Musk-like). A synonym of *S. moschata.*

S. mutata (changeable). *fl.* copper-coloured, marked with deeper-coloured dots, panicled; calyx and peduncle densely glandular; petals linear-lanceolate. June and July. *l.* flat, spathulate, cartilaginously crenated, fringed with long, viscid hairs; cauline ones obovate, ciliated at base. Stem erect, leafy, glandular. *h.* 6in. to 12in. Switzerland, 1779. (B. M. 351.)

S. nepalensis (Nepaul). A garden form of *S. Cotyledon.*

S. nivalis (snowy). *fl.* white, ¼in. in diameter, in capitate, four to twelve-flowered cymes; scape erect, simple, 3in. to 6in. high. July and August. *l.* broadly spathulate, crenate-toothed, ½in. to 1in. in diameter, sub-coriaceous, red beneath; petioles 1in. to 2in. long. Europe (Britain), &c. (Sy. En. B. 541.)

S. oppositifolia (opposite-leaved).* *fl.* bright purple, ½in. in diameter, solitary, sessile, on short, annual shoots, campanulate; petals obovate. April and May. *l.* opposite, ¼in. long, quadrifariously imbricated, thickened and obtuse at the tip, ciliated with stout bristles. Stems 6in. to 8in. long, creeping, leafy. Europe (Britain), &c. (L. B. C. 869; R. G. 1039; Sy. En. B. 540.)

S. o. alba (white-flowered). This only differs from the type in the colour of its flowers.

S. o. major (larger). A form with larger flowers than the type, but not so fine as the next variety.

S. o. pyrenaica superba (superb Pyrenean).* The rosy-lilac flowers of this form are very large, more than twice the size of those of *S. oppositifolia*, and the habit is more erect. (G. C. n. s., xxi. p. 419.)

S. pallida (pale). *fl.* white; petals persistent during the ripening of the fruit; ovary dull purplish-red; peduncles one to four-flowered, 1in. to 4in. high. Summer. *l.* spathulate, green, disposed in a small rosette. *h.* 3in. to 6in. Sikkim, 1885. A neat, rockwork plant.

S. paradoxa (paradoxical). A synonym of *S. pygmæa.*

FIG. 431. SAXIFRAGA PELTATA, showing Habit and detached Flower.

S. peltata (peltate-leaved).* Umbrella Plant. *fl.* white or very pale pink, ¼in. in diameter; petals longer than the sepals, elliptic, rounded at both ends. April. *l.* all sub-terminal, erect; petiole 1ft. to 2ft. long, cylindric, as thick as a goose-quill, glandular-pubescent; blade orbicular, peltate, 6in. in diameter, six to ten-lobed, the lobes cut and sharply toothed, pale beneath. Rootstock clothed at the tip with the broad, stipular leaf-sheaths.

Saxifraga—*continued.*

California, 1873. One of the largest species of the genus. See Fig. 431. (B. M. 6074; F. d. S. 2441; R. G. 735.)

S. pennsylvanica (Pennsylvanian). Swamp Saxifrage. *fl.* greenish, small; calyx lobes as long as the petals; scape many-flowered, erect, clammy-pubescent. May and June. *l.* clustered at the root, oblanceolate, obscurely toothed, 4in. to 8in. long, narrowed at base into short, broad petioles. *h.* 1ft. to 2ft. North America, 1732.

S. pentadactylis (five-fingered). *fl.* white, disposed in loose panicles; petals obovate, with branched nerves. May and June. *l.* on long, compressed petioles, glabrous, five-parted. Stems branched, terete, glabrous, flexuous. *h.* 3in. to 6in. Pyrenees. 1815. Plant densely tufted.

S. petræa (rock-loving). A synonym of *S. adscendens.*

FIG. 432. SAXIFRAGA PURPURASCENS.

S. purpurascens (purplish).* Purple Large-leaved Saxifrage. *fl.* purple, ⅜in. to 1in. across, nodding; petals obovate-oblong, sometimes long-clawed; panicle few-flowered, corymbose, glandular-pubescent. June. *l.* obovate-rounded, entire, 2in. to 3in. long, highly glabrous, sometimes obscurely sinuated, often impressed with dots. *h.* 3in. to 6in. Himalayas, 1850. See Fig. 432. (B. H. ix. 1; B. M. 5066; F. d. S. 1401.) SYN. *Megasea purpurascens.*

FIG. 433. SAXIFRAGA PYGMÆA.

S. pygmæa (pigmy).* *fl.* yellowish, very small; petals hardly longer than the calyx. May and June. *l.* lanceolate, nerveless, glabrous, blunt, and rather cut at the apex. Stems filiform, slender, three or four-flowered, few-leaved, glandular. *h.* 1in. to 2in. Pyrenees (not British). See Fig. 433. SYN. *S. paradoxa.*

S. pyramidalis (pyramidal). A form of *S. Cotyledon.*

S. retusa (retuse-leaved).* *fl.* purple; petals triple-nerved, acute, much shorter than the style. May and June. *l.* imbricated, oblong, trigonal, acute, full of perforated dots above, ciliated at the base. Stems few-leaved, erect. *h.* 1½in. Alps, 1826. (R. G. 1110; S. B. F. G. ser. ii. 49; A. F. P. 21, Fig. 2, under name of *S. purpurea.*)

Saxifraga—*continued.*

S. rivularis (brook-loving). *fl.* white, erect, one or two, ½in. in diameter; petals distant. July and August. *l.* reniform, palmately five-lobed, ½in. to 1in. in diameter; lobes entire; petioles as long as the decumbent, rooting stems. Britain, &c. (F. D. 118; Sy. En. B. 553.)

S. Rocheliana (Rochel's). *fl.* white, corymbose; petals obovate, twice as long as the calyx. Summer. *l.* white at the edges, and with distinct, impressed dots; lower ones lingulate, glabrous, ciliated at the base, disposed in tufts; cauline ones pale green, clothed with clammy hairs. *h.* 3in. Austria.

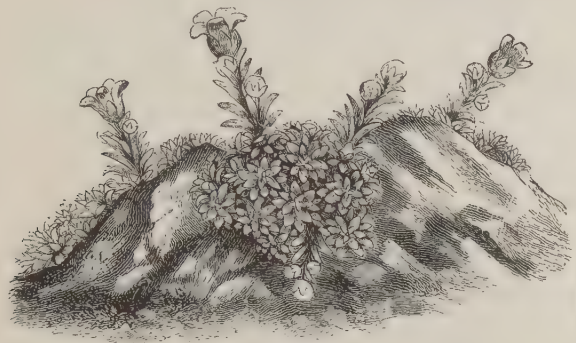


FIG. 434. SAXIFRAGA ROCHELIANA CORIOPHYLLA.

S. R. coriophylla (Coris-leaved).* *l.*, lower ones smaller and more horizontally expanded than in the type, pitted near the margins. See Fig. 434.

S. rotundifolia (round-leaved). *fl.* white, marked with scarlet dots; petals lanceolate, acute, three-nerved. May and June. *l.* reniform, unequally and coarsely toothed; cauline ones petiolate. *h.* 1ft. Austria, &c., 1596. (B. M. 424; S. F. G. 377.) The variety *repanda* is larger and more robust, and has broader leaves.

S. r. taygetea (Mount Taygetus). *fl.*, panicle branches one or two-flowered. *l.*, basal ones long-petiolate, small, with slightly hairy margins, reniform or nearly round, five to nine-lobed; upper cauline ones linear or trifid. Greece.

S. sancta (holy).* *fl.* yellow, in a short, dense spike; petals spathulate-oblong. Summer. *l.* rigid; lower ones imbricated, spreading, lanceolate, acuminate, rigidly mucronate, ciliate, denticulate on the margins, keeled; cauline ones lanceolate, mucronate. Stem glabrous, leafy. Mount Athos, 1882. Habit dense, tufted.

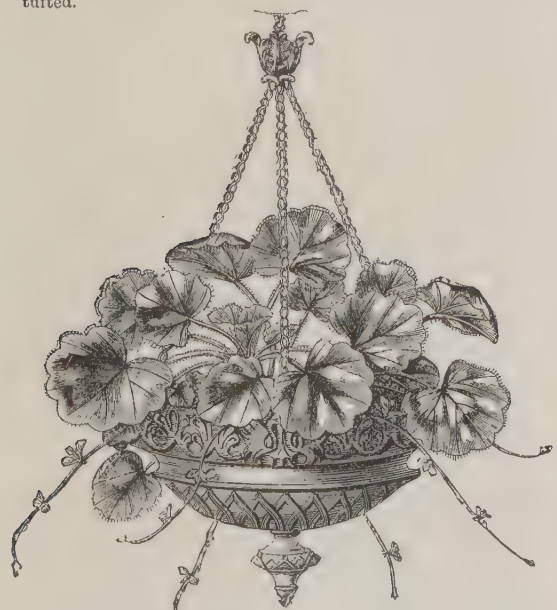


FIG. 435. SAXIFRAGA SARMENTOSA TRICOLOR.

S. sarmentosa (sarmentose).* Aaron's Beard; Creeping Sailor; Mother of Thousands; Old Man's Beard; Wandering Jew, &c.

Saxifraga—*continued.*

fl. white, two of the inner petals having a yellow spot, and the central one two scarlet spots, at the base; two outer petals large, flaccid. June and July. *l.* orbicularly cordate, crenate-lobed, pilose, red beneath. Stolons or runners creeping. *h.* 9in. China and Japan, 1815. Half-hardy. (B. M. 92.)

S. s. minor (smaller). A smaller-growing form. (B. H. vii. 13, under name of *S. s. minor semperflorens.*)

S. s. tricolor (three-coloured). This differs from the type in having the foliage beautifully blotched with creamy-white and red. It is well adapted for growing in vases and hanging baskets. See Fig. 435.

S. Schmidtii (Schmidt's). *fl.* purplish, paniculate, similar to those of *S. crassifolia.* Early summer. *l.* ovate, rounded at both ends, or attenuated into the petioles, denticulate-ciliated. Himalayas. (R. G. 946.)

S. spathulata (spathulate-leaved). *fl.*, petals obovate-oblong, twice as long as the calyx segments; panicle corymbose, three to five-flowered. June. *l.*, lower ones spathulate, ciliated, entire, obtuse at apex, rarely three-toothed, three-nerved; cauline ones linear. Stem slender, erect. Algiers.

S. squarrosa (squarrose-leaved). *fl.* white, larger than those of *S. cæsia.* Early summer. *l.* linear-elliptic, rather retuse, stiff, squarrosely imbricated, permanent, mealy when young. Stem pubescent below, usually three-flowered; branches diffuse, flaccid. Alps.

S. stellaris (starry). *fl.* few, ½in. in diameter; petals white, with two purple spots above the base; scape 3in. to 8in. high; cyme panicled. *l.* rosulate, sub-sessile, cuneate-lanceolate, ½in. to 1in. long, sub-succulent, usually coarsely toothed, ciliated, casually entire. Europe (Britain), &c. Plant glabrous or sparsely hairy stemless. (F. D. 23; Sy. En. B. 542.)

S. Sternbergii (Sternberg's). A form of *S. hypnoides.*

S. Stracheyi (General Strachey's).* *fl.* pink, ¾in. to 1in. in diameter; petals obovate-spathulate or orbicular; panicle much-branched, drooping, glandular pubescent. March. *l.* closely sheathing at base, with orbicular stipular sheaths, obovate or obovate-cuneate, 3in. to 6in. long, narrowed into the short, stout petiole, or cordate at base; margins irregularly toothed, ciliated. *h.* 4in. to 8in. Western Himalayas, 1851. (B. M. 5967.) *S. S. alba* (R. G. 1223) differs from the type in its less spreading, white petals, whitish filaments, and green styles.

S. S. Milesii (Miles'). *fl.* white; calyx and peduncle glandular-pubescent; petals white, with a distinct claw; corymbs dense. March. *l.* 9in. to 12in. long, 4in. to 5in. broad. 1872. A plant of garden origin. This resembles the type, but differs in its longer leaves, and the more distinct claw to its petals.

S. S. thysanodes (coarse-fringed). *fl.* white, clustered in a small, slightly branched raceme; petals sub-rotundate, longer than the sepals. April. *l.* obovate, deeply crenate-serrated, hairy on both sides, but especially beneath. *h.* 6in. to 8in. India. (B. R. 1846, 33.)

S. tenella (slender). *fl.* white; petals obovate-oblong, twice as long as the calyx segments; panicle few-flowered. June and July. *l.* linear-subulate, cuspidate-aristate, sparsely setulose-ciliated on the margins or glabrous, glandularly ciliated towards the base. Stems erect, slender, glabrous. *h.* 6in. Alps, 1819.

FIG. 436. SAXIFRAGA TRIFURCATA, showing Habit and detached Leaf.

S. trifurcata (thrice-forked). *fl.* white, long-stalked; petals thrice as long as the calyx, obovate-oblong. May. *l.* viscid, twice as long as the petioles, palmately three-parted, nerved; lateral lobes sub-trifid; middle one cuneate, three-toothed; cauline leaves few, shortly petiolate, trifid. *h.* 6in. Spain, 1804. See Fig. 436. SYN. *S. ceratophylla* (B. M. 1651).

Saxifraga—*continued.*

S. umbrosa (shade-loving).* London Pride; None-so-Pretty; St. Patrick's Cabbage, &c. *fl.* white, sometimes sprinkled with red, ¼in. in diameter, in a panicled cyme; sepals reddish; scape 6in. to 12in. high, leafless. June and July. *l.* petioled, orbicular or broadly ovate, coarsely crenate or toothed, rosulate, ½in. to 2in. in diameter; petioles ½in. to 1in. long. Ireland, Spain, and Portugal. A common plant in gardens. *punctata* and *serratifolia* are varieties.

S. valdensis (Lyons).* *fl.* white, comparatively large, corymbose, borne on short, hairy peduncles. May and June. *l.* dense, short, flat at the base, but more or less triquetrous at the apex, the upper surface marked with irregular dots. *h.* 3in. Alps of Lyons, &c., 1871.

FIG. 437. SAXIFRAGA VIRGINIENSIS, showing Habit and detached Portion of Inflorescence.

S. virginiensis (Virginian).* *fl.* white; petals oblong, obtuse, twice as long as the erect calyx lobes; cyme clustered, at length open and loosely panicled. April to June. *l.* obovate or oval-spathulate, narrowed into broad petioles, rather thick, crenate-toothed. *h.* 4in. to 9in. North America, 1790. See Fig. 437. (B. M. 1664; L. B. C. 1699.) *S. v. flore-pleno* is a pretty garden variety, with compact, double flowers. (R. G. 1092.) *S. elongata* is another form.

S. Wallacei (Wallace's), of gardens. A synonym of *S. Camposii.*

SAXIFRAGE. *See* **Saxifraga.**

SAXIFRAGEÆ. A natural order of trees, shrubs, or herbs, of variable habit, inhabiting temperate and frigid regions, rare in the tropics. Flowers hermaphrodite, rarely unisexual or polygamo-dicœcious; calyx five-parted, rarely four to twelve-parted, free or adnate with the ovary, the lobes valvate or imbricated; petals generally four or five, rarely wanting, perigynous, rarely epigynous, very rarely hypogynous, often small, imbricated or valvate; stamens as many, or twice as many, as the petals, rarely indefinite, erect or spreading; filaments free; anthers usually didynamous. Fruit capsular or baccate, rarely follicular, very rarely nut-like. The useful properties of *Saxifrageæ* are unimportant. The order is divided, by Bentham and Hooker, into six tribes: *Cunonieæ, Escallonieæ, Francoeæ, Hydrangeæ, Ribesieæ,* and *Saxifrageæ* proper. It embraces about seventy-five genera, and 540 species. Well-known examples are: *Astilbe, Cunonia, Escallonia, Francoa, Hydrangea, Ribes,* and *Saxifraga.*

SAXIFRAGE, BURNET. *See* **Pimpinella.**

SAXIFRAGE, GOLDEN. *See* **Chrysosplenium.**

SAXIFRAGE, MEADOW. A popular name for *Saxifraga granulata,* the genus *Seseli,* and *Silaus pratensis.*

SAXOFRIDERICIA (named in honour of Frederick Augustus, King of Saxony). ORD. *Rapateaceæ.* A genus comprising five species of robust, stove herbs, natives of Guiana and North Brazil. Flowers in sessile heads;

Saxofridericia—*continued.*

calyx tube hyaline, the lobes rigid, paleaceous; corolla tube hyaline, the lobes broad; involucral bracts two, membranous, readily parting; scape tall, often thickened under the head. Leaves radical, long, petiolate or sessile in a sheath. Only one species has yet been introduced. It thrives in a compost of loam and peat, and requires to be kept wet, as it is a marsh plant. Propagated by division.

S. subcordata (sub-cordate). *fl.* densely brown-spotted, sessile, in semi-globose, mediocre heads; spathe red, bivalved, at length splitting. *l.* distichous, ancipitous at base, then petiolate, oblong, acuminate, sub-cordate at base, 6in. or more long; petioles spiny-edged, glabrous. *h.* 1ft. Amazon, 1873. (G. C. n. s., i. 275.) SYN. *Rapatea pandanoides* (I. H. xx. 153-154).

SCAB. A disease of Potato tubers, due to the growth on them of a Fungus named *Tubercinia scabies.* It gives rise to brown, dry crusts or scabs. For an account of the disease, *see* **Potato** (FUNGI).

SCABIOSA (from *scabies,* the itch, which disease the common species is said to cure). Pincushion Flower; Scabious. Including *Asterocephalus, Knautia, Pterocephalus,* and *Succisa.* ORD. *Dipsaceæ.* A genus comprising, according to the authors of the "Genera Plantarum," not more than eighty distinct species of mostly hardy, annual or perennial herbs, sometimes more or less shrubby at base. Flower-heads blue, rose, purple, yellowish-white, or white, terminal; involucral bracts in one or two series; involucels two, four, or eight-ribbed; calyx bristly; corolla limb four or five-fid, sub-equal, or

FIG. 438. INDIVIDUAL FLOWER OF SCABIOSA.

often oblique or bilabiate (see Fig. 438); stamens four, very rarely two, all perfect. Leaves entire, toothed, lobed, or dissected. A great many species have been introduced, but the selection given below comprises the best-known. They succeed in ordinary garden soil, and may be increased by seeds, also sometimes by division. *S. atropurpurea* and its varieties are most useful subjects for cutting, and plants may be grown in pots for winter flowering with good effect. For this purpose seeds should be sown in June or July, and the plants, when large enough, potted off singly and grown in a cool frame. For flowering outside in summer, sow in March or early in April. *S. caucasica* is a very handsome border plant. The species described below are hardy perennials, except where otherwise indicated.

S. amœna (pleasing).* *fl.-heads* lilac or rose; corollas radiant; peduncles elongated, villous under the heads. June and July. *l.,* radical ones obovate, toothed or lyrate, rather hairy; cauline ones pinnatifid, with lanceolate, acute, nearly entire lobes. *h.* 2ft. to 3ft. Russia, 1820.

S. arvensis (field-loving). Egyptian or Gipsies' Rose, &c. *fl.-heads* pale lilac or blue, 1in. to 1½in. in diameter, depressed; corollas hairy, the inner redder; peduncles long, stout. July to September. *l.* variable, hairy; radical ones oblong-lanceolate, entire, serrated, or crenate; cauline ones toothed, lobed, or pinnatifid. Stem 2ft. to 5ft. high, stout, hairy. Europe (Britain), &c. (Sy. En. B. 679.)

S. atropurpurea (dark purple).* Mournful Widow; Sweet Scabious, &c. *fl.-heads* normally deep crimson, very sweet-scented; corollas radiant, a little longer than the involucre. July and August. *l.,* radical ones lanceolate-ovate, lyrate, coarsely-toothed; cauline ones pinnatipartite, with oblong, toothed or cut lobes. Stem branched. *h.* 2ft. to 3ft. South-western Europe, 1629. A very handsome, hardy annual. Under the name of *Saudade,* the flowers of this species are largely employed by the Portuguese, Brazilians, &c., for funeral wreaths, and similar purposes. See Fig. 439. (B. M. 247.) There are several desirable varieties: *flore-pleno* has double, purple or white

Scabiosa—*continued.*

flowers (F. d. S. 1203); *foliis-aureis* has very distinct, yellow leaves; *nana* is not more than 1ft. high, and very compact; *striata* has flowers spotted and streaked; two other forms have flowers white, and purple margined with white, respectively.

FIG. 439. UPPER PORTION OF PLANT OF SCABIOSA ATROPURPUREA.

S. caucasica (Caucasian).* *fl.-heads* pale blue, fully 3in. in diameter, radiant; corollas five-cleft; involucre very villous. June to August. *l.*, radical ones lanceolate, acuminate, quite entire, glaucous. *h.* 1ft. Caucasus, 1803. See Fig. 440. (B. M. 886.)

FIG. 440. SCABIOSA CAUCASICA.

S. c. elegans (elegant). *l.* whitish; cauline ones undivided, quite entire or nearly so. (R. G. 1212.)

Scabiosa—*continued.*

S. c. heterophylla (variable-leaved). *fl.-heads* pale purple, large. *l.* hairy, pinnatisect; segments linear-lanceolate, acute. 1883. (R. G. 1084.)

S. Columbaria (Columbaria). *fl.-heads* lilac or blue-purple, 1in. to 1½in. in diameter; corollas pubescent, those of the inner flowers regular, of the outer ones rayed; peduncles slender. July to September. *l.* glabrous or pubescent, very variable; radical ones narrow, petiolate, entire or divided; cauline ones pinnatifid, the segments often cut. *h.* 1ft. to 2ft. Europe (Britain), &c. (Sy. En. B. 678.)

S. graminifolia (grass-leaved). *fl.-heads* pale blue, very like those of *S. caucasica*, but much smaller. June to October. *l.* linear-lanceolate, quite entire, of a silvery-white colour. Stems suffruticose at base. *h.* 1ft. South Europe, 1683. This species is well adapted for the border or rockery. (B. R. 835.)

S. pterocephala (wing-headed). *fl.-heads* purple, 1in. to 1½in. in diameter; peduncles stout, 2in. to 3in. long. Summer. *l.* simple, elliptic, or lyrate-pinnatifid, crenately-toothed. Greece, 1881. A very ornamental, dwarf, tufted perennial. (B. M. 6526.)

S. succisa (Devil's Bit). Blue Bonnets; Blue Buttons, &c. *fl.-heads* blue-purple or white, ⅔in. to 1½in. in diameter; involucral bracts shorter than the hairy corollas; peduncles appressedly-hairy. July to October. *l.* entire, glabrous or hairy; radical ones oblong or obovate, petiolate; cauline ones few, toothed. *h.* 1ft. to 2ft. Europe (Britain), &c. (Sy. En. B. 677.)

S. Webbiana (Webb's).* *fl.-heads* creamy-yellow, on long peduncles; corollas nearly equal. July. *l.*, lower ones petiolate, obovate, crenate; upper ones pinnatifid, with ovate or oblong, entire lobes. *h.* 6in. Phrygia, 1818. Plant clothed with soft, silky, hoary tomentum. (B. R. 717.)

SCABIOUS. *See* **Scabiosa.**

SCABIOUS, SHEEP'S-BIT. A common name for *Jasione montana.*

SCABIOUS, SWEET. *See* **Scabiosa atropurpurea.**

SCABRID. Rather rough.

SCABROUS. Rough.

SCABWORT. An old name for Elecampane (*Inula Helenium*).

SCÆVOLA (from *scæva*, the left hand; alluding to the form of the corolla). ORD. *Goodenovieæ.* A genus comprising nearly sixty species of stove or greenhouse shrubs, sub-shrubs, or perennial herbs, mostly Australian; eight or ten are found in the Pacific Islands and maritime Asia, and one also in Africa and the West Indies. Flowers solitary between two bracteoles, sessile or pedunculate, in the axils of the leaves or subtending bracts, or the peduncles dichotomously branched with a flower in each fork; calyx tube adnate, the limb usually very short; corolla oblique, the tube slit open to the base on the upper side, the lobes nearly equal or the upper ones shorter; stamens free; indumentum stellate or simple. Leaves alternate or rarely opposite, entire or toothed. A selection of the species best known to gardeners is given below. They succeed in a compost of turfy loam, peat, and sand. Propagation may be effected by cuttings, inserted in similar soil, under a hand glass, those of *P. Plumieri* being placed in heat. Except in the case of the species just named, all those here described are Australian, and require greenhouse treatment.

S. anchusæfolia (Anchusa-leaved). *fl.* blue, sessile or nearly so, in a terminal, leafy spike; calyx limb obsolete; corolla ½in. or more long, hairy outside, bristly within. May. *l.* linear or oblanceolate, entire or coarsely-toothed when broad, 1in. to 2in. or more long; floral ones less than ½in. long. An erect or prostrate herb or sub-shrub.

S. attenuata (attenuated). *fl.* blue, sessile, in terminal, leafy spikes, at length long and interrupted; calyx limb prominent, annular; corolla ⅔in. long, hairy within, the throat softly bristly. June. *l.* petiolate; larger ones broadly lanceolate, few-toothed, 2in. to 3in. long; upper ones linear or linear-lanceolate, mostly entire. *h.* 1½ft. to 2ft. 1844. An erect shrub or sub-shrub. (B. M. 4196.)

S. grandiflora (large-flowered). A synonym of *Leschenaultia linarioides.*

S. Kœnigii (Kœnig's).* Malay Rice Paper Plant. *fl.* pale red, in axillary cymes, much shorter than the leaves; calyx lobes

Scævola—*continued.*

as long as, or longer than, the tube; corolla ⅜in. long, pubescent outside. August. *l.* obovate-oblong, 3in. to 5in. long, rounded and obtuse at top, entire or rarely broadly crenate, on short petioles. *h.* 2ft. 1820. An erect shrub. (B. M. 2732.)

S. microcarpa (small-fruited). *fl.* violet, in a usually long and interrupted spike; calyx lobes small; corolla hairy outside, seven to nine lines long. July. *fr.* small. *l.* petiolate, obovate, ovate, or cuneate, coarsely toothed, the lower ones often 1in. to 1½in. long, the upper ones passing into sessile floral leaves or bracts. 1790. An erect or diffuse perennial. (L. B. C. 1327; B. M. 287, under name of *Goodenia lævigata.*)

S. pilosa (pilose). *fl.* blue; calyx tube pubescent; corolla ⅜in. to 1in. long; peduncles axillary, longer than the leaves, one-flowered. May. *l.*, lower ones petiolate, obovate or oblong, coarsely toothed, 2in. to 3in. long; upper ones much smaller, sessile and stem-clasping, varying from oblong-cuneate to lanceolate. *h.* 1ft. to 3ft. 1841. A hispid perennial or sub-shrub.

S. platyphylla (broad-leaved). *fl.* white, sessile or shortly pedicellate, in a terminal, leafy spike; calyx lobes very small; corolla above 1in. long, silky-hairy, the lobes winged. May. *l.* sessile and stem-clasping, ovate, obovate, or oblong, entire or few-toothed, 1in. to 1½in., or rarely 2in., long; upper floral ones gradually becoming smaller. *h.* 2ft. 1841. An erect, hispid plant, woody at base, with rigid, herbaceous branches.

S. Plumieri (Plumier's). *fl.* white, usually in axillary, peduncled cymes; calyx limb truncate-repand or obsoletely denticulate; corolla eight to ten lines long, villous within. August. *l.* fleshy, obovate, quite entire. *h.* 2ft. West Indies, 1724. Stove shrub.

S. suaveolens (sweet-smelling). *fl.* blue, sessile, in interrupted, terminal, hirsute spikes; calyx equally five-lobed; corolla seven to eight lines long, villous or glabrous outside, toothed or softly bristly in the throat. August. *l.* petiolate, from obovate to oblong-spathulate, quite entire, thick, the larger ones 2in. to 3in. long; upper ones smaller, or linear when on elongated branches. 1793. A prostrate or decumbent, hardy perennial or sub-shrub. (A. B. R. 22, under name of *Goodenia calendulacea.*)

SCALARIFORM. Ladder-shaped.

SCALE INSECTS (*Coccidæ*). These form one of the most destructive families among Insects. They belong to the class *Homoptera*, in which are also included the Frog-hoppers and the very numerous Aphides or Greenflies, both very hurtful to many plants. The Scale Insects have been studied by several entomologists, and of late years very important advances have been made in working out the life-histories of many species; but there are very wide gaps still to be filled before satisfactory results can be arrived at with regard to the transformations and life-histories of most of the species. Among those who have done most in this field for some time past are M. Signoret, in France, and Professor Comstock, in the United States of America. Our British species have been worked out, and the results have been published in the March and April numbers of the "Entomologists' Monthly Magazine" for 1886, by Mr. J. W. Douglas. He has succeeded in identifying a large number of species of these insects in our islands. Most of them are found on wild plants; but in greenhouses some

FIG. 441. LECANIUM HESPERIDUM (FEMALE)—*a*, Twig and Leaf-stalk of Orange, bearing Female Scale Insects, natural size; *b*, Female magnified.

species (see Fig. 441) infest many of the shrubs and other plants to such a degree that, by the continued suction of the sap, and the consequent tax on their strength, the

Scale Insects—*continued.*

plants are much weakened, and ultimately die. The females and larvæ are the hurtful members of the family; while the males, when fully developed, do no harm to plants. The females are by far the more numerous, and the more conspicuous; in fact, the males of even the commonest species are seldom seen, and those of a good many are still unknown. They are most successfully procured by collecting the larvæ and pupæ, which somewhat resemble scales, very early in spring, upon branches, which, with these scales on them, should be put into some secure vessel, *e.g.*, a glass jar.

The males are very unlike the females. They usually emerge early in the year, in the form of minute flies, with the head, thorax, and abdomen distinct and well formed—two delicate wings, six legs, and usually two

FIG. 442. LECANIUM PERSICÆ, showing (*a*) Leaf with Male on it, slightly enlarged; (*b*) Male Flying, much enlarged.

slender filaments at the hinder end of the body (see Fig. 442). They have no mouth, and therefore cannot take food in this state. They seldom live more than a few days, their sole function, as perfect insects, being to fertilise the females. In certain species, both wingless and winged males have been found.

Female Scale Insects are much larger than the males, and they alone fully deserve the name of Scale Insects. They are developed from larvæ of an oval form, which have three pairs of small legs (by the aid of which they can crawl about), small antennæ, and a beak with which to bore into leaves and young stems of plants, in order to suck up the sap. The larvæ are protected by a scale-like covering on the back. This scale is formed either by an excretion from the body (in *Coccinæ* and *Lecaninæ*), which increases in size as the larva grows, or also by the cast skins (in *Diaspinæ*). After the larvæ have fixed themselves in a suitable location on a plant, by pushing in the beak, they never leave the spot. As they increase in size, they undergo great alterations in structure, whereby the body becomes more rounded, and the beak becomes situated in the middle of the lower surface of the body. The legs and antennæ, and the rings of the body, almost or altogether disappear. The females thus at last lose all power of movement. After being fertilised by the winged males, or, in some species, without the action of the male being necessary, the females produce eggs, which are packed away below the scale-like bodies, and are thus protected by them, even after the death of the mothers. The females of some Scale Insects cover the eggs also with a white coat of felted threads. In certain species, the females are viviparous.

The number of species of Scale Insects already named is very large; but of many the males, as before observed, are still unknown. A large proportion live on the woody kinds of wild plants, fixed to the bark or to evergreen leaves, but many others select hardy cultivated plants; while others are confined, in this country, to greenhouse

Scale Insects—*continued.*

plants, to which they are often very destructive. Some broods consist wholly of females, and others of both sexes. Their rate of increase is much below that of the Aphides, there being, in most of the species, only one brood in the year.

The number of species already recorded as injurious to cultivated plants, especially in the warm zones, is too large to permit of more than a brief mention here of some of the more important kinds. They have been divided, by means of comparatively minute characters, into numerous genera; some of the species live upon several kinds of plants, and, on the other hand, many plants support various kinds of these insects. The latter are so much alike as to render it vain to attempt here to state clearly the differences between the species, as these are found in minute structural characters; nor, indeed, is this necessary, since the same remedies are serviceable against all of them, and are most successful when directed against the larvæ. In Great Britain, Scale Insects are far more numerous, and are usually more injurious, in glass houses than in the open air. But among the "outdoor" kinds the following must be noted: 1. Apple Mussel Scale, or Oyster-shell Bark Louse (*Aspidiotus conchiformis* or *Mytilaspis pomorum*), like single valves of very small mussel-shells adherent to the branches of Apple-trees; they occur on both sides of the Atlantic. 2. Pear Oyster Scale (*Diaspis ostreæformis*) very like the Apple Mussel Scale but of smaller size. 3. Rose Scale (*D. Rosæ*), like a white, scurfy coat on twigs and stems of Roses, especially of cultivated kinds. 4. Camellia Scale (*Aspidiotus Camelliæ*), on buds and bracts of Camellias. 5. Spindle-tree Scale (*Chionaspis Euonymi*), so abundant on *Euonymus japonicus*, near Montpellier, in France, as to threaten the existence of the shrub. Several species are found in Britain in greenhouses, where they frequently do very great harm. Among the more hurtful are: *Aspidiotus Nerii*, on Acacias, Lemons, Oleanders, &c.; *A. palmarum*, on Palms and Cycads; *Lecanium Hesperidum* (see Fig. 441), on Orange leaves, or on other food-plants (*e.g.*, *Myrtaceæ*); and *Dactylopius adonidum*, on most greenhouse plants.

Many others have been described as very hurtful, especially by Professor Comstock in his "Report on Scale Insects"; and probably a number of these will be found in English greenhouses, *e.g.*, *Dactylopius longifilis*, on Ferns and *Euphorbiaceæ*; *D. destructor*, on Coffee, Oranges, and, in fact, almost every greenhouse plant; *Ceroplastes floridensis*, on Oranges, &c.; but for a full account of these the reader is referred to the above-mentioned work.

Remedies are two-fold, viz., natural and artificial. The best natural remedy is to encourage the multiplication of certain minute insects belonging to the great division *Hymenoptera*, which are parasitic in the Scale Insects, and destroy large numbers of them. It has been found useful to carry branches bearing Scale Insects infested with parasites to localities where the parasites did not previously exist, inasmuch as they soon multiply, and produce a marked effect on the number of Scale Insects.

Artificial remedies are numerous. Among the most useful are the following: Soap solution (½lb. of soap in one gallon of water) or kerosene solution (about one gill in five gallons of water), syringed or sprayed over the plants every second day; phenyle, in a strength of from three to six teaspoonfuls to four gallons of water, applied at intervals of eight days; alkaline washes, such as concentrated lye of wood-ashes or of coarse potash, which, used with a brush, frees the branches from the insects; strong solution of tobacco; and animal oils, *e.g.*, whale oil. The last-named suffocate the insects by closing the breathing pores along the sides of their body.

SCALE OR SCALY FERN. *See* **Asplenium Ceterach.**

SCALES. A term applied to close-pressed, small, rudimentary leaves, resembling minute scales, or to any thin, scarious bodies.

SCALIA. A synonym of **Podolepis** (which *see*).

SCALLION. A common name for *Allium ascalonicum majus*. The term is also generally applied to all Onions that do not bulb, but form long necks like Leeks.

SCALPELLIFORM. Resembling the blade of a penknife, but placed vertically on a branch.

SCAMMONY-PLANT. *See* **Convolvulus Scammonia.**

SCANDENT. Climbing.

SCAPE. A long, naked or nearly naked peduncle, rising from the crown of a root.

SCAPHYGLOTTIS (from *skaphe*, a boat, and *glotta*, a tongue; in allusion to the hollowed labellum). Boat-lip Orchid. SYN. *Cladobium*. ORD. *Orchideæ*. A small genus (about eight species) of stove, epiphytal, branched Orchids, natives of tropical America. Flowers small, twin or few in a fascicle; lateral sepals prolonged at the base, and often connate with the foot of the rather long, erect column; petals similar but smaller; lip narrow, continuous with the column, but turned up so as to be parallel with it; pollen masses four, cohering in pairs. Leaves narrow, sometimes linear, coriaceous. Stems slender, straggling. Pseudo-bulbs borne in the axils of the leaves. Only two of the species are known to gardeners. These require similar culture to **Cattleya** (which *see*).

S. stellata (star-like). This species only differs from *S. violacea* in having larger flowers, with more spreading segments, and the lateral lobes of the lip as large as the middle one. Demerara.

S. violacea (violet). *fl.* violet, minute, borne on very short peduncles; lateral sepals produced, oblique, twice as broad as the upper one; lip white, fleshy, channelled. *l.* 2in. to 3in. long, linear or linear-lanceolate, emarginate. Stems terete, striated, articulated. Demerara. (B. M. 4071; B. R. 1901.)

SCAPIFORM, SCAPOSE. Resembling a scape.

SCAPIGEROUS. Scape-bearing.

SCAR. The mark left on a stem by the separation of a leaf; or on a seed, &c., by its detachment.

SCARCE UMBER MOTH. *See* **Hybernia.**

SCARIOLE. An old name for Endive (*Cichorium Endivia*).

SCARIOUS, SCARIOSE. Thin, dry, shrivelled, membranous; *e.g.*, the involucral leaves of many species of *Centaurea*.

SCARLET RUNNER. *See* **Beans** and **Phaseolus vulgaris multiflorus.**

SCARLET STRAWBERRY. *See* **Fragaria virginiana.**

SCATTERED. Not regularly disposed; *i.e.*, not whorled, opposite, or ternate, &c.

SCELOCHILUS (from *skelos*, a leg, and *cheilos*, a lip; in reference to the shape of the divided labellum). ORD. *Orchideæ*. A small genus (three or four species) of stove, epiphytal Orchids, natives of the Andes of South America. Flowers mediocre, few in a raceme, pedicellate; sepals erect, connivent, the posterior one concave, the lateral ones connate, produced in a sac or spur; petals rather broader than the posterior sepal; lip continuous with the base of the column, long-clawed, erect; column erect, semi-terete; pollen masses two, sub-globose; bracts narrow; scapes at the base of the pseudo-bulbs, erect, simple or slightly branched. Leaf coriaceous, not plicate. Stem at length more or less thickened into a narrow

Scelochilus—*continued.*

pseudo-bulb. Only one species has been introduced. For culture, *see* **Burlingtonia.**

S. Ottonis (Otto's). *fl.* yellow, purple-striped within, short-stalked, compressed; spike a little branched, slightly longer than the leaf, round, thread-like, smooth, covered by sessile, dry, lanceolate, acuminate bracts. May. *l.* oblong, coriaceous, slightly undulated, conduplicate, and very acute at apex, recurved. Caraccas, 1841. (L. & P. F. G. iii. p. 87.)

SCENTED POLYPODY. *See* **Polypodium pustulatum.**

SCENTED VERBENA. *See* **Lippia citriodora.**

SCEPACEÆ. Included under *Euphorbiaceæ.*

SCEPASMA. Included under *Phyllanthus.*

SCEPTRANTHUS. Included under *Cooperia.*

SCHÆFFERIA (named in honour of James Christian Schæffer, 1718-1790, a German naturalist). ORD. *Celastrineæ.* A genus consisting of only two species of rigid, glabrous shrubs, natives of the West Indies, Texas, and New Mexico. Flowers greenish or white, small, in the axils of the leaves; calyx four-parted; petals four, hypogynous, oblong. Drupes the size of small peas. Leaves alternate or fascicled, small, coriaceous, entire, exstipulate, obovate or spathulate. Only one of the species has been introduced, and that possesses no particular beauty. It thrives in the stove, in a mixture of loam, peat, and sand. Half-ripened cuttings will root if inserted in sandy soil, under a hand glass, in heat.

S. frutescens (shrubby). Crabwood-tree; False Box. *fl.* white, on axillary, fascicled pedicels. August. *fr.* scarlet. *l.* elliptic, veiny, tapering at the base, 1½in. long. *h.* about 10ft. West Indies, 1793.

S. lateriflora (brick-flowered). A synonym of *Drypetes crocea.*

SCHAFFNERIA. Included under **Scolopendrium** (which *see*).

SCHAUERIA (named after John Konrad Schauer, 1813-1848, Professor at Greifswald). ORD. *Acanthaceæ.* A genus comprising about eight species of stove, glabrous or pubescent, erect herbs or sub-shrubs, natives of Brazil. Flowers often orange or red, disposed in terminal thyrses or spikes; calyx nearly five-parted, the segments linear or bristly; corolla tube slender, scarcely enlarged above, the limb bilabiate; stamens two; bracts and bracteoles linear or rarely lanceolate, rather long and coloured, or small. Leaves entire. The only species known in gardens are described below. For culture, *see* **Justicia** (under which these plants are often erroneously classified).

S. calycotricha (hairy-calyxed). *fl.*, calyx segments and bracts pale greenish or yellowish, minutely puberulous; corolla of a beautiful yellow, 1in. long, very softly pubescent; thyrse terminal, sub-spicate. February. *l.* broadly ovate, glabrous, with a very obtuse or sub-cordate base, slightly undulate-crenate. Branches slightly glabrous. *h.* 2ft. 1824. SYN. *Justicia calytricha* (H. E. F. 212).

S. flavicoma (yellow-haired). *fl.*, calyx ciliated, with numerous gland-tipped hairs. February. *l.* lanceolate, proportionately narrower, longer, and more acuminate, than those of *S. calycotricha*, acute or sub-acute at the base. (B. M. 2816, under name of *Justicia calycotricha*; B. R. 1027, under name of *J. flavicoma*; L. B. C. 1921 (?), under name of *J. calliotricha.*)

SCHEDONORUS. The species of grasses formerly classed under this heading are now removed, by Bentham and Hooker, to *Bromus* and *Festuca.*

SCHEELEA (named in honour of Scheele, a celebrated German chemist). ORD. *Palmæ.* A genus consisting of about seven species of dwarf or tall, unarmed, stove Palms, natives of tropical America. Flowers yellowish-white, dicœcious, or on the same spadix moncœcious; spathes two, the upper one fusiform, woody, acuminate; spadices long, very shortly pedunculate, with rather short, nearly erect branches. Fruit rather large, oblong or ovoid, one to three-seeded. Leaves terminal, pinnatisect; segments in series or aggregate, linear, in young plants obtuse and unequally bifid at apex, with incurved lobes (in

Scheelea—*continued.*

adults entire?), one-nerved, the margins recurved at base; rachis convex at back, acute above; petioles concave above; sheath short, opening. The under-mentioned species have been introduced to cultivation in this country. A compost of peat and loam, in about equal parts, with the addition of a little sand, is suited to their requirements. The plants may be increased by seeds. *S. unguis* is well adapted for room decoration, and, when older, for exhibition purposes.

S. excelsa (tall).* *fl.*, spathe costate; spadix simply and sparsely branched, 3ft. long, the branches 4in. to 6in. long; inflorescence axillary. *fr.* ovoid, apiculate. *l.* 15ft. to 24ft. long, elliptic, pinnatifid; leaflets linear, acute, glaucous beneath, about 180 on each side, aggregate in twos, threes, or fives, the upper ones solitary and alternate, 3ft. long, 2in. broad; petioles channelled. Trunk 40ft. to 50ft. high, glabrous, annulate, 2ft. to 3ft. in diameter, the wood reddish. Venezuela, 1826.

S. imperialis (imperial). *l.* pinnate when mature; in the young state simple, linear-lanceolate, elongated, arching, of a bright colour, and plaited. United States of Colombia, 1875. This is only known in the young state.

S. insignis (remarkable). *fl.*, spathe spongy-woody, thick, 2ft. long, terminated by a mucro 4in. to 6in. long; female spadix similar to the male, but more robust. *l.* 8ft. to 10ft. long; lower pinnæ aggregate in fours or fives; middle ones eight or more together; upper ones nearly solitary and opposite, linear-lanceolate, obtuse with a short acumen, not crisped, 1½ft. or more long. Trunk straight, 50ft. to 60ft. high. Quito, &c. SYN. *Maximiliana insignis.*

S. unguis (clawed).* *l.* erect, 2ft. to 6ft. or more in length; pinnæ about 1ft. long and 1in. broad, of a rich deep green, and reaching nearly to the base of the petiole; petioles sheathing at base, and clothed somewhat sparingly at the edges with brown fibres. A superb plant, described here as it appears in a young state, without any stem.

SCHEERIA. Included under *Achimenes.*

SCHELHAMMERA (named after G. C. Schelhammer, 1649-1716, professor at Jena). SYN. *Parduyna.* ORD. *Liliaceæ.* A small genus (two species) of greenhouse, perennial herbs, with fibrous roots and simple or branched stems, natives of Eastern Australia. Flowers terminal, pedicellate, solitary or umbellate, sessile within the last leaves; perianth of six distinct, deciduous segments, nearly equal and similar; stamens six, shorter than the segments. Leaves sessile, ovate or lanceolate, membranous. These pretty flowering plants succeed in a warm border, but the protection of a greenhouse is necessary during winter. A mixture of peat and loam is suitable for their culture. Propagation may be readily effected by division.

S. multiflora (many-flowered). *fl.* pure white, several in a terminal umbel, with sometimes a few bracts at the base of the pedicels besides the involucral leaves; pedicels ⅔in. to 1in. long. June. *l.* 1in. to nearly 2in. long, firmer than in the other species, but not so broad at the base, the margins quite entire. Stems from a knotted rhizome, simple or branched, 6in. to nearly 12in. high. 1824. (L. B. C. 1511.)

S. multiflora (many-flowered), of Loddiges. A synonym of *Kreysigia multiflora.*

S. undulata (undulated). *fl.* pale lilac, solitary, or rarely two together at the ends of the branches; pedicels ½in. to 1in. long, without bracts. June. *l.* ovate-lanceolate, 1in. to nearly 2in. long, varying in breadth, the margins minutely undulated. Stems slender, diffuse and branching at base, ascending or erect, rarely above 6in. in height. 1824. (B. M. 2712.)

SCHELLOLEPIS. Included under *Polypodium.*

SCHELVERIA. A synonym of *Angelonia.*

SCHEUCHZERIA (named in honour of John and James Scheuchzer, Swiss botanists). ORD. *Naiadaceæ.* A monotypic genus. The species, *S. palustris*, is a curious, highly glabrous, Rush-like, marsh herb, with a six-parted perianth, and erect, slender leaves. It has no horticultural value, but is occasionally found wild in England and Scotland.

SCHIDOSPERMUM. A synonym of *Chlorophytum.*

SCHIMA (said to be the Arabic name). ORD. *Ternströmiaceæ.* A small genus (about four species) of stove trees or shrubs, inhabiting tropical Asia and the Indian Archipelago. Flowers showy, bibracteolate; sepals five,

Schima—*continued.*

scarcely unequal; petals five, much larger, connate at base, closely imbricated; stamens numerous; peduncles one-flowered, frequently erect, solitary in the axils, or the upper ones clustered in a short raceme. Leaves perennial. The only species introduced thrives in a peaty soil, and is propagated by cuttings inserted in sandy peat, in bottom heat.

S. Noronhæ (Noronha's). *fl.* white; sepals very concave; petals obovate, spreading; stamens very numerous; peduncles solitary, axillary, single-flowered, shorter than the leaves. August and September. *l.* alternate, elliptic-lanceolate, acuminated, entire, penninerved, tapering into a short petiole. Branches terete. A compact-growing shrub. Tropical Asia, 1849. (B. M. 4539, under name of *Gordonia javanica*.) SYN. *S. superba*.

S. superba (superb). A synonym of *S. Noronhæ*.

Schinus—*continued.*

sessile. "The leaves of some of the species are so filled with a resinous fluid that the least degree of unusual repletion of the tissue causes it to be discharged; thus, some of them fill the air with fragrance after rain; and *S. Molle* and some others expel their resin with such violence, when immersed in water, as to have the appearance of spontaneous motion, in consequence of the recoil" (B. R. 1580). The two species introduced require culture similar to that recommended for the stove species of **Rhus** (which *see*).

S. Molle (*Mulli*, the Peruvian name). Australian or Californian Pepper-tree; Peruvian Mastic-tree. *fl.* yellowish-green. July and August. *fr.* of a beautiful rose-colour, the size of peas. *l.* with numerous pairs of lanceolate, serrated leaflets, the terminal one longest. *h.* 20ft. Brazil and Peru, 1597. (B. M. 3339.)

FIG. 443. SCHISMATOGLOTTIS CRISPATA.

SCHINUS (from *Schinos*, the old Greek name used by Theophrastus for the Mastic-tree, *Pistacia Lentiscus*; applied to this genus on account of the resinous, mastic-like juice which exudes from the species). ORD. *Anacardiaceæ*. A genus comprising twelve species of stove shrubs or small trees, inhabiting the warmer parts of South America. Flowers whitish, small, dicœcious; calyx short, with five imbricated lobes; petals five, imbricated; disk annular, rather broad; stamens ten; panicles axillary and terminal, bracteate. Drupes globose, oily. Leaves alternate, impari-pinnate; leaflets opposite or alternate,

S. terebinthifolius (Terebinthus-leaved). *fl.* greenish-white, racemose. July. *l.* composed of seven somewhat serrated, almost equal leaflets. *h.* 20ft. Brazil, 1830.

SCHISMATOGLOTTIS (from *schisma*, *schismatos*, deciduous, and *glotta*, a tongue; the limb of the spathe soon falls off). SYN. *Zantedeschia* (of Koch). ORD. *Aroideæ* (*Araceæ*). A genus of about fifteen species of stove, stoloniferous herbs, natives of the Malayan Archipelago. Spathe cylindrical, the tube convolute, scarcely constricted at throat, the lamina apiculate or acuminate; spadix sessile, inappendiculate, included in the spathe,

Schismatoglottis—*continued.*

constricted at or below the middle; male inflorescence cylindrical or club-shaped; female shorter or narrower, cylindrical or conical; peduncles solitary or fascicled, shorter than the petioles. Leaves oblong- or ovate-cordate, rarely hastate or lanceolate, often marbled or spotted; petioles sheathing at base. Caudex short. The introduced species are described below. They require a moist atmosphere, and an abundance of water and shade. A well-drained compost of rich, sandy loam, fibry peat, and leaf mould, is most suitable. Propagation may be effected by division.

Schismatoglottis—*continued.*

bright green above; under surface and petioles vinous-purple. Java, 1882. (I. H. 468, under name of *S. L. Lansbergiana.*)

S. L. purpurea (purple).* *l.* bright green above, and blotched as in the type; under surface and petioles of a deep vinous-purple. Sumatra, 1882.

S. longispatha (long-spathed).* *fl.* curious in structure, the most conspicuous part being the small, yellowish-green spadices. *l.* obliquely ovate, about 4in. long, lightish green, marked with a feathered, central band of silvery-grey, through which runs the distinct green midrib; petioles as long as, or longer than, the blades. Stems short, erect, tufted, spreading by short rhizomes. Borneo, 1881. See Fig. 444, for which we are indebted to Mr. Wm. Bull. (I. H. 466.)

S. neoguineensis (New Guinea).* *fl.*, spathe pale greenish, with

FIG. 444. SCHISMATOGLOTTIS LONGISPATHA.

S. crispata (curled).* *fl.*, spathe green at the persistent, basal part, creamy-white and open in the upper, deciduous part; inflorescence sub-sessile. *l.* cordate-oblong, shortly cuspidate, dark green above, with a broad, irregular, greyish band on each side of the midrib, midway between it and the margin, or with greyish stripes running from the midrib between the veins; petioles with crisped, transparent edges. Borneo, 1881. See Fig. 443, for which we are indebted to Messrs. Veitch and Sons. (B. M. 6576.)

S. decora (comely). A synonym of *S. pulchra.*

S. latifolia (broad-leaved). A synonym of *S. rupestris.*

S. Lavallei (Lavalle's). *l.* bright green on the upper surface, variegated with irregular, greyish blotches, light green below. Borneo and Sumatra. (I. H. xxviii. 418.) Of this pretty, variegated Aroid, the following are two distinct varieties:

S. L. immaculata (unspotted). *l.* of a uniform, unspotted, a narrowly ellipsoidal, obscurely trigonous tube 1in. long, and an acuminate limb 1½in. long; inflorescence solitary in the axils of the leaves; scapes 1½in. to 3in. long, inclosed in the sheaths of the petioles. *l.* ovate, acute, deeply cordate at the base; upper surface bright green, marked in a very irregular manner with large, pale yellowish-green blotches; petioles 9in. to 12in. long, terete, sheathing at the base. New Guinea, 1879. (I. H. 380, under name of *Colocasia neoguineensis.*)

S. picta (painted). *fl.*, spathe tube obliquely ovoid-oblong, the lamina greenish-yellow, gaping, shortly cuspidate; male inflorescence of a pale sulphur colour. *l.* cordate-ovate, contracted into a cuspidate acumen, having a feathered, greyish band running down the middle; petioles as long as the blades. Java, 1864.

S. pulchra (pretty).* *l.* obliquely oblong, acute, cordate at base, 4in. to 5in. long, 1¾in. to 2½in. broad, of a peculiar glaucous-green

Schismatoglottis—*continued.*

above, covered with irregular, silvery-green spots. Borneo, 1884. A charming little foliage plant. (I. H. 520.) SYN. *S. decora.*

S. rupestris (rock-loving). *fl.*, spathe yellow, the tube oblong-ovoid, the lamina scarcely opening; peduncles many. *l.* ovate, acute, deeply cordate, the lobes semi-ovate; petioles longer than the blades, sheathing about one-third their length, slightly terete above. Caudex thick. Java, 1882. SYN. *S. latifolia.*

S. siamensis (Siam). *l.* ovate, acuminate, glossy-green, spotted with white. This plant, from its comparatively small size and neat habit, is very useful for decorative purposes. Siam, 1884.

S. variegata (variegated).* *fl.*, spathe having a glaucous-green tube, and a pale yellowish-green, boat-shaped lamina; peduncles short, but longer than the spathe. *l.* oblong-lanceolate, obtuse or scarcely rounded at base, narrowed and long-cuspidate at apex, dark green, with a broad, silvery, central band beneath; petioles half the length of the blades, rather broadly sheathing at base. Borneo 1862. Plant stemless.

SCHISMUS (from *schisma*, a cleft; alluding to the divided outer palea). SYNS. *Electra*, *Hemisacris*. ORD. *Gramineæ*. A small genus (three or four species) of tufted, annual, usually dwarf, hardy grasses, inhabiting the Mediterranean region. Flowers in a narrow, dense or rather loose panicle, with erect branchlets. Leaves narrow, sometimes bristly. *S. marginatus* has been introduced, but it has no horticultural interest.

SCHISTACEOUS. Slate-grey.

SCHIVERECKIA. Included under *Alyssum.*

SCHIZÆA (from *schizo*, to split; in allusion to the fan-shaped or dichotomously-multifid fronds). Comb or Rush Fern. Including *Actinostachys* and *Lophidium.* ORD. *Filices.* A genus comprising about sixteen species of ornamental, stove, greenhouse, or hardy Ferns, widely diffused. Capsules sessile, two-valved, in two to four rows, covering one side of close, distichous spikes, which form separate fertile segments at the tips of the fronds. The introduced species are described below; they are rather difficult subjects to grow. A compost of rough peat and loam, ample drainage, and an abundance of water, are necessary. For general culture, *see* **Ferns.**

S. bifida (twice-cleft).* *sti.* dense, chestnut-brown, passing gradually into the fronds, which are 6in. to 18in. long, forked generally below the middle, sometimes forked again, casually simple, very wiry and Rush-like, with a prominent, scabrous midrib and two narrow, thick wings; fertile segments sub-erect or recurved, unilateral, ½in. to ¾in. long, with ten to twenty erecto-patent spikes on each side. Australia, &c., 1822. Greenhouse.

S. dichotoma (dichotomous). *sti.* 6in. to 18in. long, firm, erect, channelled on the face above. *fronds* fan-like, 6in. to 9in. each way, many times dichotomously forked, the ultimate divisions with one fertile segment to each; rachis with four to ten close-spreading spikes on each side. West Indies, &c. Stove.

S. digitata (digitate). *sti.* dense, 1in. to 2in. long, brownish, sub-terete, passing gradually into the fronds, which are 1ft. or more long, one to two lines broad, flattened, the midrib beneath prominent, crowned at the apex with six to fifteen sub-triquetrous, fertile spikes which are 1½in. long. Malay Isles, &c. Stove. (H. G. F. 54.)

S. elegans (elegant). *sti.* 6in. to 12in. long, firm, erect, naked. *fronds* V-shaped, 4in. to 8in. each way, dichotomously forked or cleft, the divisions varying greatly in number and breadth (½in. to 2in.); fertile segments copious, distinctly stalked, ½in. to ¾in. long, the rachis often recurved, with six to fifteen close-spreading, linear-cylindrical spikes on each side. West Indies, &c., 1819. Stove. (H. G. F. 34.) *latifolia* is a form with broad fronds.

S. penicillata (pencil-like). A synonym of *S. pennula.*

S. pennula (small-winged). *sti.* dense, 1in. to 2in. long, brownish, passing gradually into the fronds, which are 1ft. or more long, nearly one line thick, triquetrous, with three sharp angles, crowned at the apex with six to twelve sub-triquetrous, fertile spikes, which are ½in. to 1½in. long, pilose beneath, with the capsules usually in four rows. South America, 1816. Stove. SYN. *S. penicillata.*

S. pusilla (dwarf). *sti.* dense. *barren fronds* much shorter than the fertile ones, much twisted and slightly flattened. *fertile fronds* 3in. to 4in. long, terete, wiry, very slender; fertile segments sub-erect, ¼in. long, unilateral, with about six rather stout, erecto-patent spikes on each side, the lowest ⅛in. long. United States. Hardy in the South of England.

S. rupestris (rock-loving).* *sti.* lax, about 1in. long, sub-terete, passing gradually into the fronds, which are grass-like and flattened, 3in. to 4in. long, one line broad, with a slender midrib; fertile segments pinnate, solitary, sub-erect, ¼in. to ½in. long, with six to ten slender, spreading, serrated spikes on each side. Australia, 1822. Greenhouse. (H. G. F. 42.)

SCHIZANDRA (from *schizo*, to cleave, and *aner*, *andros*, a male; the stamens are split). Including *Maximowiczia* and *Sphærostema.* TRIBE *Schizandreæ* of ORD. *Magnoliaceæ.* A genus comprising six species of ornamental, stove, greenhouse, or hardy, sarmentose shrubs; one is a native of North America, and the rest are found in tropical or Eastern Asia. Flowers red, yellowish, or whitish, unisexual; sepals and petals nine to twelve, passing gradually the one into the other; stamens of the males five to fifteen, more or less united in a globe or ring; carpels of the females numerous; peduncles solitary, one-flowered. Leaves membranous, pellucid-dotted, exstipulate. The under-mentioned species are those best known in gardens; they thrive in a mixture of sandy loam and peat. Ripened cuttings will root readily if inserted in sand, under a glass.

S. chinensis (Chinese). *fl.* pale rose. Summer. *fr.* scarlet, persistent during a great part of the winter. *l.* simple. *h.* 20ft. Northern China, 1860. A handsome, hardy, climbing shrub.

FIG. 445. PORTION OF FLOWERING BRANCH OF SCHIZANDRA COCCINEA.

S. coccinea (scarlet). *fl.* crimson, small, on long peduncles; stamens five; uppermost flowers mostly staminate. May and June. *l.* alternate, oblong, acuminate, long-petioled, 3in. to 4in. long, often somewhat toothed. Stem climbing high. North America, 1806. Greenhouse. See Fig. 445. (B. M. 1413.)

S. marmorata (marbled). *l.* of a bold character, acuminately heart-shaped, beautifully marked with silvery, fleece-like spots or clouds on the green surface. Borneo, 1860. A fine, stove climber. SYN. *Sphærostema marmoratum.*

S. propinqua (related). *fl.* pale yellow, at length orange, solitary or twin, drooping a little. July. *l.* ovate-lanceolate, rounded or cuneate at base, long-acuminated at apex. *h.* 6ft. Nepaul, 1828. Stove. (B. M. 4614, under name of *Sphærostema propinquum.*)

SCHIZANDREÆ. A tribe of *Magnoliaceæ.*

SCHIZANTHES. Included under *Narcissus.*

SCHIZANTHUS (from *schizo*, to cut, and *anthos*, a flower; alluding to the incised corolla). Butterfly or Fringe Flower. ORD. *Solanaceæ*. A small genus (about seven species have been described) of very beautiful and showy, erect, more or less glandular-viscous, half-hardy, annual herbs, restricted to Chili. Flowers variously coloured; calyx deeply five-cleft; corolla tube short or elongated, cylindrical; limb spreading, oblique, plaited, sub-bilabiate, imbricated, elegantly incised; perfect stamens two; cymes terminal. Leaves often pinnatisect, the segments entire or toothed. The species and varieties of *Schizanthus* form very elegant, free-flowering, border plants, in summer and autumn, outside. The half-hardy kinds may be sown in a little heat, in spring, and afterwards planted out; or in autumn, and preserved in a cool house or pit through the winter. *S. pinnatus* and its garden varieties are hardy, and will grow and flower freely if sown in the open ground, in March or April. These plants are well adapted for pot-culture to flower in early spring; for this purpose, seeds should be sown in August or September, and the young plants grown on singly in a frame or house where frost is merely excluded. They may be grown to flower in 7in. or 8in. pots, during early spring, when the plants become, in a greenhouse temperature, a mass of elegant foliage and curiously-shaped blossoms. Seeds ripen in great abundance. A rich soil is advisable for pot-culture, after the plants are strong enough to bear it; in the open ground, also, they well repay liberal treatment. The best-known species are here described.

S. candidus (white).* *fl.*, corolla white; anterior lip segments laterally bilobed, the lobes shortly and irregularly incised. July. *l.* pinnatisect or deeply pinnatifid; segments entire, few-toothed. *h.* 2ft. 1843. Allied to *S. Hookeri*. (B. R. 1843, 45.)

S. Evansianus (Evans'). A synonym of *S. pinnatus*.

FIG. 446. FLOWERING BRANCH AND DETACHED FLOWER OF SCHIZANTHUS GRAHAMI.

S. Grahami (Graham's).* *fl.* ample; corolla lilac or rose-colour; upper lip yellow, tipped with lilac; tube equalling the calyx. June to October. *l.* once or twice pinnatisect; segments entire or dentate-pinnatifid. *h.* 2ft. 1831. See Fig. 446. (B. M. 3044; F. d. S. 712; R. G. 385.)

S. G. retusus (retuse).* *fl.* much larger than in the type; corolla intense rose-colour; middle segment of the anterior lip orange near the apex. *l.* less dissected. (B. M. 3045, B. R. 1544, and

Schizanthus—*continued.*

S. B. F. G. ser. ii. 201, under name of *S. retusus*.) A sub-variety has white flowers with crimson tips.

S. Hookeri (Hooker's). *fl.*, corolla pale rose-colour, except the middle of the upper segment, which is yellow; middle segment of the lower lip furnished with two long horns; stamens long-exserted. *l.* similar to those of *S. Grahami*. *h.* 2ft. 1828. (B. M. 3070.)

S. pinnatifidus (pinnatifid-leaved). A synonym of *S. pinnatus*.

S. pinnatus (pinnate-leaved).* *fl.*, corolla tube shorter than the calyx; posterior lip often violet or lilac, the middle segment cucullate, bilobed; anterior lip pale, the middle segment more or less yellowish, and spotted with purple or violet, emarginate, the lateral ones four-lobed. June to October. *l.* once or twice pinnatifid; segments entire, toothed, or incised-pinnatifid. *h.* 2ft. 1822. The following figures represent different forms of this variable plant: B. M. 2404; B. R. 725, 1562; H. E. F. 73; P. M. B. ii. 198; S. B. F. G. 63, and ser. ii. 97. SYNS. *S. Evansianus* (L. & P. F. G. viii. 171), *S. pinnatifidus*, *S. porrigens* (B. M. 2521; H. E. F. 86; S. B. F. G. 76). *S. Priestii* (L. & P. F. G. i. 31) is a white-flowered form.

S. porrigens (spreading). A synonym of *S. pinnatus*.

S. Priestii (Priest's). A form of *S. pinnatus*.

S. retusus (retuse). A synonym of *S. Grahami retusus*.

SCHIZOBASIS (from *schizo*, to cut, and *basis*, the base; the withered perianth separates at its base from the receptacle, and is pushed off by the swelling fruit in the form of a calyptra). ORD. *Liliaceæ*. A genus consisting of five species of stove or greenhouse, bulbous plants, natives of tropical and South Africa. Flowers small, racemose or scattered at the sides of the branches; perianth marcescent, persistent, with equal, spreading segments; stamens six; bracts minute or obsolete. Leaves radical, early, few, linear, rather thick, absent in flowering specimens. Stem leafless, slender, branched. *S. intricata*, the only species introduced, requires greenhouse heat, and full sunshine. It thrives in light loam, and may be increased by seeds, or by offsets.

S. intricata (intricate). *fl.*, perianth white, with a green dorsal rib; racemes ultimately very loose, 1½in. to 2in. long; panicle obversely deltoid, 2in. to 6in. long and broad, the branches ascending; scape firm, slender, 2in. to 6in. long. *l.* four to ten, subulate, erect, fleshy, glabrous, 2in. to 3in. long. South Africa, 1875.

SCHIZOCÆNA SINUATA. A synonym of *Cyathea sinuata*.

SCHIZOCARP. A pericarp which splits into one-seeded pieces.

SCHIZOCENTRON. A synonym of **Heeria** (which *see*).

SCHIZODIUM (from *schizo*, to cut; alluding to the cleft column). ORD. *Orchideæ*. A genus comprising ten species of slender, terrestrial, greenhouse Orchids, with undivided tubers, natives of South Africa. Upper sepal erect, concave or galeate, the base produced in a spur, the lateral ones free and spreading; petals erect or spreading; lip spreading from the base of the column, free, contracted above into a claw, not spurred, the blade undivided; column very short, bipartite. Leaves sub-radical, usually small. None of the species are at present in cultivation.

SCHIZOLOBIUM (from *schizo*, to split, and *lobos*, a pod; probably alluding to the dehiscence of the pod). ORD. *Leguminosæ*. A genus comprising two (?) species of tall, stove, evergreen trees, one from Brazil, and the other (perhaps a variety) a native of Panama. Flowers racemose; calyx segments imbricated, reflexed; petals five, unguiculate, ovate or rounded; stamens ten, free; racemes axillary or paniculate at the tips of the branches; bracts small. Pods one-seeded. Leaves bipinnate, ample; leaflets numerous, small. *S. excelsum* has been introduced, and requires culture similar to that recommended for **Cæsalpinia**.

S. excelsum (lofty). *fl.* yellow; peduncles glabrous; pedicels adpressedly pilose. *l.* eighteen-jugate; leaflets 2in. long, about twenty-jugate, oblong, very shortly petiolulate, white beneath, and golden-pilose on the middle nerve; common petiole often 2ft. long, glabrous. *h.* (in Brazil) 120ft. 1874.

SCHIZOLOMA. Included under **Lindsaya** (which *see*).

SCHIZOMERIA (from *schizo*, to cut, and *meris*, a part; alluding to the cut petals). ORD. *Saxifrageæ*. A monotypic genus. The species is an ornamental, greenhouse, evergreen tree, thriving in a mixture of loam and sandy peat. Propagated by cuttings.

S. ovata (ovate-leaved). *fl.* white, small, in terminal, trichotomous cymes; calyx five-lobed, with a short tube; petals five, toothed. June. *fr.* a rather large, ovoid or globular drupe. *l.* ovate or ovate-lanceolate, obtuse or acuminate, mostly 3in. to 4in. long, nearly entire, or with irregular, obtuse serratures. *h.* (in its native place) 50ft. Australia, 1825.

SCHIZONEURA LANUGINOSA. *See* **American Blight, or Woolly Aphis.**

SCHIZOPETALON (from *schizo*, to cut, and *petalon*, a petal; alluding to the cut or divided petals). ORD. *Cruciferæ*. A genus comprising five species of erect, slightly-branched, half-hardy, annual herbs, natives of Chili. Flowers purple or white, in terminal, leafy-bracted racemes; sepals erect, sub-equal at base; petals unguiculate, pinnately lobed, involute in æstivation. Leaves alternate, sinuate-toothed or pinnatifid. *S. Walkeri*, the only species introduced, is a singular plant, thriving in a compost of loam, peat, and sand. Specimens should be raised in pots, in a greenhouse, during spring; some of them may then be planted out in the borders; others may be kept in pots, and placed in an airy part of the greenhouse, where they will produce seeds, although sparingly. When transplanting, care must be taken not to injure the roots.

S. Walkeri (Walker's).* *fl.* white, in long racemes; pedicels each furnished with a linear bract. May to August. *l.* alternate, sinuately pinnatifid. *h.* 1ft. to 2ft. 1821. Whole plant beset with branched down. (B. M. 2379; B. R. 752; H. E. F. 74; S. B. F. G. ser. ii. 387.)

SCHIZOPHRAGMA (from *schizo*, to cut, and *phragma*, an inclosure or wall; the portions of the wall between the ribs of the fruit fall away when it is ripe). ORD. *Saxifrageæ*. A monotypic genus. The species is a hardy shrub, allied to *Hydrangea*, which it much resembles in its flowers. It will thrive in any garden soil, but succeeds best when planted against a wall. Propagation may be effected by cuttings, inserted in sand, under a bell glass, in slight bottom heat; or by seeds.

S. hydrangeoides (Hydrangea-like). Climbing Hydrangea. *fl.* white or flesh-coloured; calyx tube turbinate, the limb five-toothed; petals five, valvate; cyme corymbose, nearly flat at top, terminal, upwards of 6in. in diameter. Autumn. *l.* deciduous, opposite, often reddish, 2in. to 4in. long, ovate-cordate, deeply toothed, long-acuminate, long and slenderly petiolate. A tall climber. Japan, 1879. (R. H. 1881, p. 313; S. Z. F. J. 26.)

SCHIZOPLEURA. Included under *Beaufortia*.

SCHIZOPTERIS. Included under *Cheilanthes*.

SCHIZOSTEMMA. A synonym of **Oxypetalum** (which *see*).

SCHIZOSTYLIS (from *schizo*, to cut, and *stylos*, a style; the style is divided into three long, filiform branches). ORD. *Irideæ*. A genus consisting of a couple of species of greenhouse or half-hardy, South African plants. Flowers sessile in a spathe; perianth red, showy, the tube slender, very shortly enlarged at the throat, the lobes equal, oblong or ovate, spreading; stamens affixed to the throat; spathes scattered at the sides of a simple peduncle. Leaves linear or narrow-ensiform. Stems fascicled on a rhizome, ebulbous or slightly bulbous-thickened at base. *S. coccinea*, the only species introduced, is a very handsome inhabitant of our gardens. It grows freely in a warm, sunny border, such as may often be found in front of a glass structure. The shoots are produced in abundance, and the flowers, which appear in autumn, retain their beauty for a considerable period. The plant is also well adapted for pot-culture, as the

Schizostylis—*continued.*

flowers come to perfection, under such treatment, in a greenhouse, and are very useful for cutting. Propagation may be readily effected, in spring, by dividing the plants, and inserting pieces, consisting of from four to six shoots, in prepared soil, about 9in. apart. Sandy loam and peat, or leaf soil, forms a good compost.

S. coccinea (scarlet).* Crimson Flag; Kaffir Lily. *fl.* ten to fourteen in a distichous spike; perianth tube shorter than the bracts; limb 2in. across, of six spreading, uniform, ovate-oblong, very acute lobes; anthers yellow. October and November. *l.* long, sheathing, sword-shaped, carinate, the longest arising from the base; upwards they gradually form bracts. *h.* 3ft. 1864. Half-hardy. (B. M. 5422; F. d. S. 1637; F. M. 183; I. H. 394.)

SCHKUHRIA (named after Christian Schkuhr, 1741-1811, of the University of Wurtemburg, who published some botanical works). SYNS. *Mieria*, *Tetracarpum*. Including *Achyropappus* and *Chamæstephanium*. ORD. *Compositæ*. A genus comprising about eight species of annual herbs, natives of South and Central America as far as Mexico. Flower-heads yellow, small, long-stalked. Leaves slender, dissected. The species have no horticultural value.

SCHLIMMIA (named in compliment to M. Schlim, one of M. Linden's plant-collectors). ORD. *Orchideæ*. Three species have been referred to this genus; they are closely-related, stove, epiphytal Orchids, natives of the Columbian Andes. Flowers rather large, fleshy, few in a raceme, shortly pedicellate; posterior sepal free, concave-carinate; lateral ones very broad, connate with the foot of the erect column; petals narrower, spreading at apex; lip variously lobed, the apex reclining on the foot of the column; pollen masses two; bracts oblong; scapes erect or recurved, simple, few-sheathed. Leaf coriaceous, contracted into the petiole. Pseudo-bulbs oblong, somewhat fusiform, one-leaved. Two of the species have been introduced. They should be grown in a pot with good drainage, and placed in the Cattleya house.

S. jasminodora (Jasmine-scented). *fl.* white and very fragrant; dorsal sepal linear, erect; petals reflexed; lip fleshy, shorter than the column, and articulated with it, with three knobs near the foot of the column, another in the middle of its length, and a fifth, which is concave, at its extremity, which is prolonged into a thin, trowel-shaped limb; scape 1ft. high, bearing three secund flowers. *l.* oval, long-stalked. Pseudo-bulbs long and slender. New Grenada, 1852. (L. & P. F. G. iii. p. 115.)

S. trifida (three-cleft). *fl.* having a delicious perfume, between those of Jasmine and Bergamot; dorsal sepal turned downwards; lateral ones waxy-white, with a few purple spots inside; petals linear, acute, bent outwards; lip having a pandurate hypochil, trifid at apex, white, marked with rich orange; peduncle lateral, drooping, deep purple, bearing a one-sided raceme of about four flowers. *l.* oblong, acute. Pseudo-bulbs elongate-ovate, clustered. New Grenada, 1877. (G. C. n. s., vii. 141.)

SCHLUMBERGERIA (named in honour of F. Schlumberger, a Belgian horticulturist). *Anoplophytum* has been used as a generic name for one or more of the species. ORD. *Bromeliaceæ*. A rather doubtful, South American genus, comprising two or three species of stove, perennial herbs. Flowers mediocre or rather large, disposed in rather loosely-branched spikes; sepals erect, convolute-imbricated, free; petals connate in a tube, the limb free, spreading or at length reflexed; stamens adnate to the tube; bracts shorter than the calyx. Leaves rosulate, entire, long-ligulate. The species require culture similar to **Tillandsia** (which *see*).

S. Lindeni (Linden's). This is the correct name of the plant described in this work as *Massangea Lindeni*.

S. Morreniana (Morren's). *fl.* yellow; bracts dark purple; spikes several, dense-flowered, congested into a short, compact bunch; scape tall, with green, adpressed bracts. *l.* gracefully recurving, 3ft. long, green, marked with numerous darker green, transverse lines above, and with reddish lines beneath. Habitat unknown. 1883. A noble plant. (B. H. 1883, 4-6.)

S. Roezlii (Roezl's). *fl.* sessile, spirally arranged, 1in. long; calyx green; corolla white and green, salver-shaped. *l.* 1½ft. long, 1½in. wide, spreading, unarmed, green. *h.* 3ft. Andes of Peru, 1879. A plant of bold habit. (B. H. 1879, 19.)

SCHMIDELIA (named after C. C. Schmidel, 1718-1792, Professor of Botany at Erlangen). SYNS. *Allophyllus, Aporetica, Ornitrophe.* ORD. *Sapindaceæ.* A large genus (about eighty species) of stove, erect or sub-erect shrubs or small trees, mostly tropical American; several are found in tropical and South Africa, tropical Asia, the Pacific Islands, and Australia. Flowers small or minute, globose, in simple or loosely-panicled, axillary racemes; sepals and petals four, the latter rarely absent. Leaves alternate, exstipulate, one to three (rarely five) foliolate; leaflets usually ample, entire or serrated, membranous, often dotted or lined. A few of the species have been introduced, but they are probably lost to cultivation.

SCHŒNIA (named in honour of Dr. Schœn, a botanist). ORD. *Compositæ.* A monotypic genus, differing from *Helichrysum* chiefly in the flat achenes of the circumference. The species is an erect, corymbosely-branched, scabrous-pubescent or more or less cottony-woolly, greenhouse annual. It requires culture similar to that recommended for **Helichrysum.**

S. Cassiniana (Cassini's). *fl.-heads* yellow, disposed in a loose, terminal corymb; outer involucral bracts usually brown, the radiating laminæ of the inner bracts white or pink. April. *l.* lanceolate or linear, or the lower ones oblong-spathulate, the longest above 2in., the upper ones few and small. *h.* 1ft. to 2ft. Australia, 1845. (L. J. F. 149; B. M. 4650 and F. d. S. 630, under name of *S. oppositifolia.*)

SCHŒNOPRASUM. Included under *Allium.*

SCHŒNORCHIS (from *schoinos*, a rush, and *Orchis*; in reference to the Rush-like leaves). ORD. *Orchideæ.* A monotypic genus. The species — a stove, epiphytal Orchid, with rather small, racemose flowers, linear-terete, sub-distichous leaves, and elongated, leafy stems—has not yet been introduced to cultivation. It is a native of Java.

SCHŒNUS (from *Schoinos*, an old Greek name for a Rush or Sedge as far back as Homer). Including *Chætospora.* ORD. *Cyperaceæ.* A genus comprising about sixty species of stove, greenhouse, or hardy, usually perennial, Rush-like herbs, chiefly inhabiting temperate regions. Spikelets few-flowered, often fascicled; fascicles forming a dense, terminal head, or variously apicate or paniculate. *S. ferrugineus* and *S. nigricans* are British plants. Several exotic species have been introduced, but they possess no interest from a garden standpoint.

SCHŒPFIA (named in honour of John Schœpf, a German botanist). SYNS. *Codonium, Hœnkea.* ORD. *Olacineæ.* A genus comprising about ten species of stove or greenhouse, glabrous shrubs or small trees, natives of tropical Asia and America. Flowers pale yellow or white, often comparatively large, disposed in short, sometimes very short, axillary, solitary or fasciculate racemes; calyx small, cyathiform; disk hypogynous, adnate with the ovary; petals four to six, coalescing in a tubular-campanulate corolla. Leaves entire, coriaceous. *S. fragrans*, the only species introduced, thrives in a compost of peat, loam, and sand. Rooted cuttings should be inserted in sand, under a hand glass, in heat.

S. fragrans (fragrant). *fl.* yellow, fragrant, ¼in. in diameter; racemes half the length of the leaves; rachis slender; pedicels six to eight, ¼in. to 1in. long. June. *l.* narrow-lanceolate, acuminate, scattered, 2in. to 3in. long, acute at both ends; petioles ¼in. long, channelled above. Branches terete, smooth. *h.* 15ft. Nepaul, 1827.

SCHOLLERA. A synonym of **Oxycoccus** (which *see*).

SCHOLLIA. A synonym of **Hoya** (which *see*).

SCHOMBURGKIA (named after Sir R. Schomburgk, 1804-1865, a traveller in Guiana, and other parts of South America). ORD. *Orchideæ.* About a dozen species have been referred to this genus; they are stove, epiphytal, pseudo-bulbous or caulescent Orchids, natives of tropical America. Flowers showy, pedicellate; sepals

Schomburgkia—*continued.*

and petals free, spreading, undulated; lip erect, shortly connate with the base of the straight or incurved column, the middle lobe rounded or broadly two-lobed and flat, or narrower and undulated, the side lobes loosely infolding the column; pollen masses eight; bracts persistent; raceme borne on an elongated peduncle. Leaves ovate, oblong, or elongated, thickly coriaceous or rigidly fleshy. The most desirable species are described below. "They succeed in the Cattleya house on blocks, or in baskets suspended from the roof, in moss, or moss and peat mixed together; or they may be grown in pots equally well, if that system is preferred. A liberal supply of water is necessary during the growing season; but after they have completed their growth, water should be withheld until they begin to show flower. Propagation is effected by parting the stems" (B. S. Williams).

S. crispa (curled). *fl.*, sepals and petals brown, oblong, having a yellow, undulated margin; lip white, ovate-oblong, obtuse, obscurely three-lobed; raceme broad, crowded; peduncle arising from the base of the upper leaf, 3ft. to 4ft. long. Winter. *l.* two or three at the tip of the stem, oblong-lanceolate. Stems fusiform, 1ft. high. Demerara, 1844. This species does best in a pot or basket; the flowers are sometimes wholly of a dull brick-red. (B. R. 1844, 23; L. S. O. 10.)

S. grandiflora (large-flowered). A synonym of *S. tibicinis grandiflora.*

S. Lyonsi (Lyons'). *fl.* on long pedicels; sepals and petals white, spotted and transversely barred with purple, ovate, obtuse, crispy; lip white, yellow-edged, scarcely spotted, acute; raceme broad, many-flowered; scape 3ft. to 4ft. long. August. *l.* like those of *S. crispa.* Stems about 1ft. high. Jamaica, 1853. This species, which has been called "the prettiest of the genus," succeeds either in a basket or on a block. (B. M. 5172; F. d. S. 2130.)

S. marginata (margined). *fl.*, sepals and petals dull brick-red, oblong, spreading, remarkably crisped or undulated; lip nearly white, tinged with pink, yellow at base, oblong-ovate, less waved than the sepals; stalk 1ft. to 1½ft. high, bearing a broad raceme or corymb. *l.* two or three to a pseudo-bulb, large, oblong-lanceolate, coriaceous. Pseudo-bulbs oblong, furrowed, stipitate, and sheathed with pale brown scales. Surinam, 1838. (B. M. 3729; L. S. O. 13.)

S. tibicinis (cow-horn). Cow-horn Orchid. *fl.* 2in. to 3in. across, many, in a terminal panicle; sepals and petals pale mauve-purple, flushed with crimson, oblong, obtuse, wavy; lip white, rose-coloured on the large, erect side lobes; scape 5ft. or more long. May and June. *l.* two or three, oblong, spreading. Stems conical in outline, horn-shaped, annulate, furrowed, 1½ft. long, hollow, of ample size. Honduras, 1834. A truly noble plant, succeeding best on a block, with plenty of heat and moisture. (W. O. A. 205.) SYN. *Epidendrum tibicinis.*

S. t. grandiflora (large-flowered).* *fl.* more handsomely coloured and larger than in the type; sepals and petals rather pale purple, deeper and redder inside, especially towards the ends; side lobes of the lip purplish towards the edges outside, orange streaked with purple within, the disk white, the front lobe white stained with yellow, and bordered with purple. 1844. SYN. *S. grandiflora* (B. M. 4476; B. R. 1845, 30; F. d. S. 49).

S. undulata (waved).* *fl.* densely racemose; sepals and petals rich brownish-purple, rounded and crisped, longer than the lip; lip clear violet-purple, cucullate, the middle lobe oval, acute or obtuse, the lateral ones rounded; bracts very long, spathe-like. January. Pseudo-bulbs fusiform. La Guayra, New Grenada, 1843. (W. S. O. ser. ii. 21; B. R. xxxi. 53, under name of *Bletia undulata.*)

SCHOTIA (named in honour of Richard Van der Schot, a travelling companion and friend of Jacquin; he died in 1819). Kaffir Bean-tree. ORD. *Leguminosæ.* A genus comprising four species of greenhouse, unarmed shrubs or small trees, confined to Southern and sub-tropical Africa. Flowers crimson, pink, or flesh-coloured, showy, panicled; calyx segments four, closely imbricated; petals five, nearly equal, sub-sessile, imbricated; stamens ten, free or very shortly connate at base; bracts and bracteoles ovate or oblong, highly caducous. Pods oblong or broadly linear, often falcate, flat-compressed. Leaves abruptly pinnate; leaflets coriaceous or small; stipules short. The species, the best-known of which are described below, are very handsome subjects when in flower. They require similar treatment to **Schmidelia** (which *see*).

S. latifolia (broad-leaved). Elephant Hedge Bean-tree. *fl.* rose or flesh-colour, sub-sessile, in excessively branched, axillary and

Schotia—*continued.*

terminal panicles; petals longer than the calyx. June. *fr.*, pods 1½in. to 4in. long, edible when roasted. *l.* two to four-jugate; leaflets variable in shape, 1½in. to 2in. long, ½in. to 1in. broad, rigid and thick. *h.* 20ft. to 30ft. 1815. Tree. (H. E. F. 159.)

S. speciosa (showy). *fl.* crimson, pedicellate; petals much longer than the calyx; panicles terminal, fasciculate-corymbose, many-flowered. Summer. *l.* polymorphous, four to sixteen-jugate; leaflets variable in shape, pubescent or glabrous. *h.* 8ft. to 12ft. 1759. A large shrub or small tree.

S. tamarindifolia (Tamarind-leaved). *l.*, leaflets eight to ten pairs, linear-oblong, oblong, or elliptic, mucronate or obtuse, unequal, sub-truncate or rounded at base, four to five lines long. 1795. (B. M. 1153; A. B. R. 348, under name of *S. speciosa*.)

SCHOUSBŒA. A synonym of *Cacoucia*.

SCHOUWIA (named in honour of J. F. Schouw, 1787-1854, a celebrated Danish botanist). ORD. *Cruciferæ*. A genus consisting of three species of tall, branched, highly glabrous, hardy herbs, natives of Arabia. Flowers purple, at first corymbose, afterwards racemose, slenderly pedicellate; sepals sub-erect, the lateral ones broader; stamens free. Leaves entire. *S. arabica* is a pretty annual; it only requires sowing in the open border. A light, sandy soil is most suitable.

S. arabica (Arabian). *fl.* rose-purplish. June. *l.*, upper ones deeply auriculate-amplexicaul. *h.* 1ft. 1837.

SCHRADERA (named in honour of Henry Adolf Schrader, 1767-1836, a German botanist.) SYNS. *Fuchsia* (of Swartz), *Urceolaria* (of Cothenius). ORD. *Rubiaceæ*. A genus of about five species of stove, sub-epiphytal, highly glabrous shrubs, with thick, rooting branches, natives of Brazil, Guiana, the West Indies, and the Gorgona Islands. Flowers in compact, globose, terminal heads; calyx tube turbinate or hemispherical, produced above the ovary; corolla thickly coriaceous, hypocrateriform, the limb of five to ten narrow, spreading or reflexed lobes; stamens five to ten. Leaves opposite, petiolate, thickly coriaceous, oblong; stipules large, connate in a sheath. *S. cephalotes*, the only species introduced, thrives in a compost of sandy loam and peat. Propagated by cuttings, inserted in sand, under a glass, in heat.

S. cephalotes (headed). *fl.* white; corolla salver-shaped, eight to ten-lobed, the tube twice as long as the calyx. July. *l.* elliptic or lanceolate-oblong; stipules spathulate-oblong, blunt, as long as the petioles. *h.* 4ft. Jamaica, 1820.

SCHRANCKIA (named after F. P. Schrank, 1747-1835, a German botanist). Sensitive Briar. Including *Leptoglottis*. ORD. *Leguminosæ*. A genus comprising about half-a-score species of stove or hardy herbs or sub-shrubs, often prostrate, armed with recurved prickles, natives of America. Flowers rose or purplish, in globose heads or cylindrical spikes; calyx small; petals connate in the middle, and forming a funnel-shaped corolla. Pods linear, acute or acuminate, prickly. Leaves bipinnate, often sensitive; leaflets small; stipules bristly. The under-mentioned species merit attention on account of their leaves, which fall at the slightest touch. The plants thrive in a mixture of loam, peat, and sand. Propagation may be effected by young cuttings, inserted in sand, under a bell glass, in heat; or by separating the root tubers.

S. aculeata (prickly). *fl.* red, in solitary heads. July. *l.* with two or three pairs of pinnæ, each pinna bearing numerous pairs of leaflets. Stem tetragonal. Roots creeping. *h.* 1ft. to 2ft. Vera Cruz, 1733. Stove, herbaceous perennial.

S. uncinata (hooked). Sensitive Briar. *fl.* rose-coloured, in round heads. June to August. Pods 2in. long, densely prickly. *l.*, leaflets elliptic, reticulated with veins beneath; partial petioles four to six pairs. Prickles hooked. *h.* 2ft. South United States, &c., 1789. Half-hardy, herbaceous perennial.

SCHREBERA (of Thunberg). A synonym of **Hartogia** (which *see*).

SCHUBERTIA (of Martius). A synonym of **Physianthus** (which *see*).

SCHUBERTIA (of Mirbel). A synonym of **Taxodium** (which *see*).

SCHULTESIA (of Roth). A synonym of **Wahlenbergia** (which *see*).

SCHWÆGRICHENIA. A synonym of **Anigozanthos** (which *see*).

SCHWANNIA (named in honour of Theodor Schwann, a physician at Bonn). SYN. *Fimbriaria*. ORD. *Malpighiaceæ*. A small genus (five species) of stove, evergreen, climbing shrubs, confined to Brazil. Flowers red; calyx deeply five-cleft, with eight glands; petals shortly clawed, fringed; stamens six, unequal, all fertile; filaments unequally monadelphous, glabrous; umbels or racemes four-flowered, often paniculate, terminal; peduncles bracteate at base, bibracteolate at apex. Leaves opposite, entire, petiolate, glandless; stipules inconspicuous. *S. elegans*, the only species introduced, is a desirable shrub, thriving in a compost of loam, leaf mould, and sand. It may be increased by ripened cuttings, inserted in sand, under a glass, in heat.

S. elegans (elegant). *fl.*, petals pubescent; umbel paniculate; stamens scarcely exserted; peduncles and calyx silky. June. *l.* ovate or sub-orbicular, acuminate, beneath softly and densely pubescent; petioles having four to six glands. Branchlets silky. 1842.

SCHWARTZIA. A synonym of **Norantea** (which *see*).

SCHWEIGGERIA (named in compliment to Aug. Frid. Schweigger, 1783-1821, Professor of Botany at Königsburg, one of the authors of a Flora of Erlangen). Foreign Violet. SYN. *Glossarrhen*. ORD. *Violarieæ*. A genus comprising only a couple of species of beautiful, erect, stove shrubs; one is Brazilian, the other Mexican. Three outer sepals larger than the two narrow, inner ones; petals spurred at base; peduncles axillary, one-flowered, articulated above the bracts. Leaves alternate; stipules minute. *S. pauciflora*, the only species introduced, succeeds in a mixture of loam, peat, and sand. It may be increased by young cuttings, which will strike readily, if inserted in sand, under a hand glass, in heat.

S. pauciflora (few-flowered). *fl.* white. December. *l.* tapering much to the base, obovate-spathulate, obtuse, crenate-serrated. *h.* 4ft. to 6ft. Brazil, 1838. (B. R. 1841, 40.)

SCHWENKFELDA. A synonym of **Sabicea** (which *see*).

SCHWENKIA (named after J. T. Schwenck, 1619-1671, a Professor of Medicine at Jena). SYNS. *Chætochilus*, *Mathea*, *Matthisonia*. ORD. *Solanaceæ*. A genus comprising about a score species of stove herbs or sub-shrubs, natives of South America, one being also found in tropical Africa. Flowers yellowish-green or whitish; calyx five-toothed or five-cleft; corolla with an elongated tube, its limb five-toothed, with two to five club-shaped glands placed between the teeth; stamens exserted or included; peduncles one-flowered or simply few-flowered, paniculate. Leaves entire, ovate or narrow. *S. americana*, probably the only species in cultivation, is an annual, thriving in any light soil. It may be multiplied by seeds.

S. americana (American). *fl.* lilac; corolla ¼in. long; pedicels scarcely longer, or shorter, than the calyx; panicle slender, many-flowered. August. *l.* petiolate; lower ones ovate, 1in. to 1½in. long, narrowed at base; upper ones oblong; floral ones minute. *h.* 2ft. Brazil, &c., 1781.

SCHWEYCKERTA. A synonym of **Limnanthemum** (which *see*).

SCIADOCALYX. Included under *Isoloma*.

SCIADOPHYLLUM (from *skias*, *skiados*, a shade or canopy, and *phyllon*, a leaf; the leaves are large, and, consequently, afford much shade). Sometimes erroneously spelt *Sciodaphyllum*. SYN. *Actinophyllum*. ORD. *Araliaceæ*. A genus comprising about twenty-two species of stove or greenhouse trees or shrubs, inhabiting tropical America. Flowers hermaphrodite or polygamous; petals

Sciadophyllum—*continued.*

five, rarely four; heads or small umbels disposed in simple racemes, paniculate, or umbellate. Leaves digitately compound; leaflets entire; stipules often elongated. A selection from the introduced species is given below. They are well worth cultivating on account of their fine foliage. A mixture of loam, peat, and sand, is the most suitable soil. Propagation may be readily effected by cuttings, inserted in sand, under a hand glass, in moderate heat.

S. acuminatum (acuminate-leafleted). *fl.* yellow, in heads little larger than a pea. May. *l.*, leaflets seven to eleven, petiolulate, oblong, obliquely acuminate, coriaceous, glabrous, reticulately veined. Stems climbing. *h.* 10ft. Peru. Greenhouse.

S. Brownii (Brown's). Galapee-tree. *fl.* white, nearly capitate, in very long, compound racemes. June. *l.*, leaflets seven to eleven, nearly umbellate, petiolulate, oblong-lanceolate, glabrous, unequal, the central ones smallest. Stem arboreous. *h.* 10ft. to 15ft. Jamaica, 1793. Stove.

S. conicum (conical-flowered). *fl.* whitish-red, in heads about the size of a pea; racemes two or three, rather velvety. May. *l.*, leaflets seven to thirteen, petiolulate, oblong, abruptly acuminate, coriaceous, glabrous, reticulately veined. Stem shrubby. *h.* 10ft. Peru. Stove.

SCIADOPHYLLUM (of Blume). A synonym of **Heptapleurum** (which *see*).

SCIADOPITYS (from *skyas*, a parasol, and *pitys*, a Fir-tree; referring to the spreading whorls of leaves). ORD. *Coniferæ*. A monotypic genus. The species is a tall, but very slow-growing, hardy, evergreen tree. It thrives in rich, moist loam, and may be propagated by imported seeds. Now and then, seeds are ripened in this country.

S. verticillata (whorled).* Parasol Fir. *fl.* monœcious; male catkins terminal, somewhat globular; females solitary, growing from amongst the scaly buds. *cones* elliptic-cylindrical, 2½in. long, 1½in. in diameter. *l.* long, linear and somewhat falcate, smooth, entire, alternate, without any footstalks, tapering to an obtuse point, concave and ribbed on the under side, in close tufts of from thirty to forty at the ends of the shoots, forming a sort of whorl in the form of an extended parasol. Branches alternate or in whorls. Stem straight. *h.* 80ft. to 120ft. Japan, 1861. (G. C. 1861, p. 360, 1862, p. 23, 1872, p. 1526; G. C. n. s., xvii. p. 113, xix. p. 85; S. Z. F. J. 101-2.) There are several varieties, in addition to the following:

S. v. variegata (variegated). This differs from the type in having some of its leaves of a pale yellow, intermixed in the parasol-like whorls.

SCILLA (the old Greek name used by Hippocrates). Squill; Wild Hyacinth. Including *Barnardia* and *Ledebouria*. ORD. *Liliaceæ*. A genus embracing nearly eighty species of stove, greenhouse, or hardy bulbous plants, natives of Europe, temperate and mountainous Asia, and extra-tropical, or the mountains of tropical, Africa, with one from Chili. Flowers small or mediocre, racemose, on articulated pedicels; perianth blue, rose, or purplish, persistent for some time; segments nearly equal, distinct or very shortly connate towards the base, spreading, or rarely campanulate-connivent at base, one-nerved; stamens six, affixed at the base or below the middle of the segments; bracts small; racemes sometimes elongated and many-flowered, sometimes reduced to two or three, occasionally nearly corymbiform; scape simple, leafless. Leaves radical, linear, loriform, oblong, or nearly ovate. Bulb tunicated. *S. autumnalis*, *S. nutans*, and *S. verna*, are natives of Britain. Hardy Scillas are amongst the most beautiful of spring-flowering bulbous plants. They succeed in ordinary garden soil, and require to be planted in early autumn when the bulbs are resting. *S. sibirica* is also well suited for culture in pots; but these must be kept in a cold house or frame, and not subjected to heat. The greenhouse species succeed in sandy loam, and in pots 5in. in diameter, along with other Cape bulbs, in a cool greenhouse. Propagated by seeds, when obtainable, which is, however, a very slow process; and by offsets.

The selection of species given below includes the most popular and beautiful. Most of the descriptions are translated from Mr. Baker's admirable Monograph of the genus, which appeared in the "Journal of the Linnean Society," vol. xiii. The leaves, except where otherwise stated, are cotemporary with the flowers.

Scilla—*continued.*

S. amœna (pleasing).* Star Hyacinth. *fl.*, perianth blue, rarely whitish, five to six lines long, the segments lanceolate; pedicels ascending ¼in. to ⅜in. long; raceme loosely three to six-flowered, 1in. to 3in. long; scape weak, 4in. to 6in. long. March. *l.* four or five, flaccid, lorate, ascending, glabrous, 6in. to 9in. long, ¼in. to ⅜in. broad. Austria, Germany, &c., 1596. Hardy. (B. M. 341; J. F. A. 218; L. B. C. 1015.)

S. a. sibirica (Siberian). A synonym of *S. sibirica*.

S. amœnula (rather pretty). A synonym of *S. sibirica*.

S. autumnalis (autumnal). *fl.*, perianth reddish-purple, ¼in. in diameter; pedicels ascending or spreading; racemes short; scapes several, equalling the leaves. July to September. *l.* autumnal, succeeding the flowers, narrow, 3in. to 6in. long, half-terete, grooved above. Europe (Britain), North Africa. Hardy. (B. M. 919; Sy. En. B. 1526.) The form *iaponica* has beautiful rose-coloured flowers.

S. Bertheloti (Berthelot's). *fl.*, perianth pale lilac, campanulate, one line long; pedicels ascending, as long as the perianth; raceme twelve to twenty-flowered, 1in. to 2in. long; scape slender, 6in. to 8in. long. April. *l.* five or six, slender, spreading, lorate, 6in. to 12in. long, ⅛in. to ¼in. broad, long-attenuated. Tropical Africa, 1862. Greenhouse. (B. M. 5308.)

S. bifolia (two-leaved).* *fl.*, perianth blue, sometimes reddish or whitish, four to five lines long, the segments spreading; pedicels ascending, ¼in. to 1in. long; raceme deltoid, three to eight-flowered, 1in. to 1½in. broad; scape solitary, 3in. to 6in. long. March. *l.* usually two, opposite, narrowed at apex, cucullate, 4in. to 8in. long, ⅛in. to ¼in. broad, concave on the face. Mediterranean region, &c. Hardy. (B. M. 746; J. F. A. 117.)

S. b. præcox (early). *fl.* ten to fifteen, appearing earlier than those of the type, rather large; pedicels 1in. to 1½in. long. *l.* thicker and broader. A robust form. (S. B. F. G. ser. ii. 14, under name of *S. præcox*.) *S. rosea* is a sub-variety of this, with reddish flowers.

S. b. taurica (Taurian). *l.* usually three or four. Tauria. (R. G. 307.)

S. campanulata (bell-shaped). A synonym of *S. hispanica*.

S. chinensis (Chinese).* *fl.*, perianth rose-purple, one line long; bracts whitish, minute; pedicels ascending, about ¼in. long, the lower ones often twin; raceme somewhat dense, twenty to sixty-flowered, 1in. to 2in. long; scape slender, straight, 1ft. or more long. June. *l.* two or three, equalling or exceeding the scape, rather hard, acute, channelled down the face. China, 1826. Half-hardy. SYN. *Barnardia scilloides* (B. M. 3788; B. R. 1029).

S. concinna (neat). *fl.*, perianth rose-purple within, oblong-campanulate, ¼in. long; pedicels all erecto-patent, four to five lines long; raceme dense, twenty to thirty-flowered, oblong, 1½in. to 2in. long; scape firm, erect, terete, 2in. to 6in. long. Spring. *l.* three or four, nearly erect, linear, 8in. to 9in. long, ⅛in. to ⅜in. broad, profusely purple-spotted at back. South Africa, 1862. Greenhouse. (Ref. B. 235.)

S. concolor (one-coloured). *fl.*, perianth greenish, rounded, campanulate, about ¼in. long; pedicels two to four lines long, the lower ones drooping; racemes dense, thirty to fifty-flowered, oblong-cylindrical, 3in. to 4in. long; scapes one to three, flexuous, 3in. to 4in. long. Spring. *l.* five or six, falcate, ligulate-lanceolate, 5in. to 8in. long, 1½in. to 1¾in. broad, obtuse or subacute, very slightly narrowed at base, unspotted. South Africa, 1862. Greenhouse. SYN. *Drimia Cooperi* (Ref. B. 18).

S. Cooperi (Cooper's). *fl.*, perianth bright purple, drooping, campanulate, ¼in. long, the divisions reflexed from half-way down when expanded; pedicels ⅜in. to ½in. long, spreading, or the lowest slightly nodding; raceme moderately dense, thirty to fifty-flowered, 2in. to 3in. long, 1in. broad; scape firm, erect, 4in. to 5in. long. Spring. *l.* four or five, ascending, 10in. to 12in. long, ½in. to ¾in. wide, green, streaked and spotted with purple on the back downwards. Cape of Good Hope, 1866. Greenhouse. (B. M. 5580.)

S. Cupani (Cupani's). *fl.*, perianth blue, ¼in. long, the segments oblong-obtuse; bracts whitish, slightly ciliated, ½in. to ⅜in. long; pedicels ascending, 1in. to 2in. long; raceme loosely six to twelve-flowered, sub-corymbose or deltoid, 1½in. to 2in. long and broad; scape slender, flexuous, 3in. to 6in. long. June. *l.* six to eight, lorate-lanceolate, spreading, 3in. to 4in. long, six to eight lines broad, the margins pellucid and minutely ciliated. Sicily, 1834. Hardy. (B. R. 1878.)

S. floribunda (bundle-flowered). *fl.*, perianth greenish without, rose-purple within; pedicels six to eight lines long, the central ones spreading, the lower ones drooping; raceme rather dense, containing sixty to a hundred or more flowers, 6in. to 8in. long, 2in. broad; scape erect, 6in. to 9in. long. Spring. *l.* nearly erect, lorate, about 1ft. long, 1⅜in. to 2in. broad, acute, scarcely narrowed at base, pale green, with large blotches of deeper green. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 188.)

S. hispanica (Spanish).* Large or Spanish Bluebell or Squill. *fl.*, perianth usually blue, but often changing to rose-purple or

Scilla—*continued.*

whitish, sub-globose-campanulate, ¼in. to ⅜in. long; lower pedicels ½in. to 1in. long; raceme equilateral, rather loosely six to twelve-flowered; scape 6in. to 9in. long. May. *l.* five or six, glabrous, ascending, linear-lorate, ¼in. to ⅜in., or in cultivated specimens 1in., broad, sub-obtuse, convex at back. Spain and

FIG. 447. SCILLA HISPANICA, showing Habit and detached Single Flower.

Portugal, 1683. Hardy. See Fig. 447. SYNS. *S. campanulata* (B. M. 127), *S. patula*, *Agraphis paniculata*. The variety figured in B. M. 1102 has spreading, rather smaller flowers. The following forms, quoted in nurserymen's catalogues, differ in the colour of the flowers: *alba*, pure white; *aperta*, light blue; *a. purpureo-striata*, light blue, with deeper stripe; *carnea*, flesh-coloured; EMPEROR, porcelain, lined blue, very large and beautiful.

S. Hughii (Hugh's). A form of *S. peruviana glabra.*

S. humifusa (prostrate). *fl.*, perianth reddish-green, small; pedicels one line long; raceme 3in. to 4in. long; scape 3in. to 4in. long, purple at base, green above. Spring. *l.* two or three, cordate-oblong, 3in. to 4in. long, 1½in. to 2in. broad, pale green, with a few blotches of a darker tint. Natal, 1881. Greenhouse.

S. hyacinthoides (Hyacinth-like).* *fl.*, perianth bluish-lilac, about ¼in. long, the segments ligulate, puberulous at apex; bracts whitish, minute, persistent; pedicels erecto-patent, the lower ones 1in. to 1½in. long; racemes containing fifty to a hundred and fifty flowers, 6in. to 18in. long, 2in. to 2½in. broad; scape straight, 1ft. to 2ft. or more long. August. *l.* ten to twelve, spreading, 1ft. to 1½ft. long, ½in. to 1½in. broad, narrowed to both ends, minutely ciliate-denticulate on the margins. Mediterranean region, 1585. Hardy. (B. M. 1140.)

S. indica (Indian). *fl.*, perianth greenish-purple, ¼in. to ⅜in. long, somewhat rounded-campanulate, the segments falcate; pedicels somewhat spreading, three to four lines long; raceme dense, thirty to sixty-flowered, oblong-cylindrical, 2in. to 4in. long; scapes one to three, flexuous, 2in. to 6in. long. June. *l.* five or six, oblong or lanceolate, acute, often with tiny bulbils on the margins, narrowed at base, 3in. to 6in. long, ½in. to 1½in. broad. India, 1816. Stove. SYN. *Ledebouria hyacintha* (B. M. 3226).

S. italica (Italian). *fl.*, perianth blue, nearly or quite ½in. long, segments puberulous at apex; bracts twin; raceme dense, six to thirty-flowered, at first conical, when expanded 1in. to 2in. long, ⅜in. to 1in. broad; scape solitary, slender, 6in. to 10in. long. May. *l.* four to six, lorate, flaccid, spreading, acute, carinate, 4in. to 8in. long, ½in. to ¾in. broad, narrowed at apex. Italy, &c., 1605. Hardy. (B. M. 663; L. B. C. 1483.) *S. purpurea* is a robust garden form of this species with more deeply-coloured flowers.

S. lanceæfolia (lance-leaved). *fl.*, perianth sub-globose-campanulate, nearly ¼in. long, the segments purple within, greenish at back, ligulate-lanceolate; pedicels five to six lines long, the lower ones deflexed; raceme dense, thirty to fifty-flowered, oblong, 2in. to 3in. long, 1½in. to 1½in. broad; scapes one to three, firm, terete, 2in. to 4in. long, often decurved. May. *l.* six to eight, somewhat spreading, oblong, acute, 4in. to 6in. long, 1½in. to 2in. broad, very slightly narrowed at base, pale green and spotted on the face. Cape of Good Hope, 1818. Greenhouse. (Ref. B. 182.) SYNS. *Drimia acuminata* (L. B. C. 1041), *Lachenalia lanceæfolia* (B. M. 643).

Scilla—*continued.*

S. l. ovatifolia (ovate-leaved). *l.* shorter than in the type, broadly ovate, 2in. to 3in. long, 1½in. to 2in. broad. 1862. SYN. *S. ovatifolia* (Ref. B. 183).

S. lanceolata (lanceolate). *fl.*, perianth greenish-purple, tubular-campanulate, ⅜in. long; pedicels dotted with red, somewhat spreading, the lower ones 5in. to 6in. long; raceme very loose, eight to twelve-flowered, 1½in. to 2in. long, 1½in. broad; scape flexuous, 4in. to 5in. long. September. *l.* five or six, lanceolate, acute, 3in. to 4in. long, eight to ten lines broad, green, unspotted. Cape of Good Hope, 1774. Greenhouse. SYNS. *Drimia lanceolata*, *Lachenalia reflexa* (A. B. R. 299).

S. latifolia (broad-leaved). *fl.*, perianth lilac, campanulate, ⅜in. long, the segments ligulate; pedicels spreading, the lower ones five to seven lines long; raceme dense, thirty to sixty-flowered, 3in. to 4in. long, 1in. to 1½in. broad; scape straight, 1ft. or more long. May. *l.* six to nine, enveloping the base of the scape, lanceolate, slender, 1ft. to 1½ft. long, 1½in. to 2in. broad, narrowed at base and apex, the margins glabrous. Canary Islands, 1777. Greenhouse. *S. lusitanica* (B. M. 1999) is only a robust garden form of this species.

S. linearifolia (linear-leaved). *fl.*, perianth greenish outside, purple within, nearly or quite ½in. long, oblong-campanulate, the segments falcate; pedicels three to five lines long, the lower ones drooping; raceme rather dense, thirty to forty-flowered, oblong, 2in. to 3in. long, 1½in. to 1½in. broad; scape flexuous, 3in. to 4in. long. Spring. *l.* four to six, nearly erect, linear, 9in. to 12in. long, four to eight lines broad, acute, very slightly narrowed at base, pale green, purple-spotted at back. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 184.)

S. livida (livid). *fl.*, perianth green, tinged on the outside with very dull purple, ⅜in. long, oblong; pedicels erecto-patent, ¼in. to ⅜in. long; raceme dense, oblong, 3in. to 4in. long, fifteen to sixteen lines broad; scape terete, 4in. to 5in. long. July. *l.* six to eight in a rosette, sessile, lanceolate, 6in. to 8in. long, 1in. to 1½in. broad, gradually narrowed to an acute point, green and unspotted. Cape of Good Hope, 1883. Greenhouse.

S. lorata (lorate-leaved). *fl.*, perianth livid-purple, the segments tinged with green at back and on the margins, three to four lines long, oblong-campanulate; pedicels four to five lines long, the lower ones drooping; raceme rather dense, thirty to sixty-flowered, oblong-cylindrical, 3in. to 4in. long, 1½in. to 1⅞in. broad; scape terete, erect, 8in. to 9in. long, spotted below. Spring. *l.* five or six, nearly erect, lorate-lanceolate, 8in. to 9in. long, ten to twelve lines broad, acute, slightly narrowed at base, green, purple-spotted at back. Cape of Good Hope, 1862. Greenhouse. SYN. *Drimia apertiflora* (Ref. B. 19).

S. lusitanica (Portuguese). A form of *S. latifolia.*

S. Macowani (MacOwan's). *fl.*, perianth greenish both inside and out, campanulate; raceme dense, conical, twenty to thirty-flowered; scape equalling the leaves. May. *l.* three or four, linear, green. *h.* 6in. South Africa, 1873. Greenhouse. This resembles *S. Cooperi*, but is inferior to that species from a horticultural standpoint.

S. maritima (sea-loving). A synonym of *Urginea maritima.*

S. microscypha (small-cupped). *fl.*, perianth green; racemes dense, 5in. to 6in. long; scape green, as long as the leaves. Spring. *l.* two or three, cordate-oblong, 1ft. long, 4in. to 4½in. broad, glaucous-green, marked near the base beneath with purplish-brown bars, and with darker green stripes higher up. Natal, 1881. Greenhouse.

S. monophylla (one-leaved). *fl.*, perianth blue, campanulate, three to four lines long; pedicels ascending, the lower ones ¼in. to 1in. long; racemes loose, six to twenty-flowered, 1in. to 2½in. long, 1½in. to 1½in. broad; scape slender, flexuous, 3in. to 6in. long. May. *l.* usually solitary, inclosing the base of the scape, ascending, lorate, 6in. to 9in. long, six to eight lines broad, acute at apex. Spain, Portugal, 1821. Hardy. SYN. *S. pumila* (B. M. 3023).

S. natalensis (Natal). *fl.*, perianth blue, three to four lines long, the segments stellate, spreading; bracts solitary; pedicels ascending, the lower ones ⅜in. to 1in. long; raceme dense, containing fifty to a hundred or more flowers, 6in. to 12in. long, 2½in. to 3in. broad; scape erect, terete, four to six lines thick, 1ft. to 1½ft. long. April. *l.* four to six, lorate-lanceolate, green, glabrous, 9in. to 12in. long, 3in. to 4in. broad, ascending, narrowed and acute at apex. Natal, 1862. Greenhouse. (B. M. 5379; F. d. S. 1043.)

S. n. sordida (mean). *fl.* smaller and fewer than in the type; scape slender. *l.* tinged with brown, 7in. to 8in. long, 1¼in. to 1½in. broad.

S. nonscripta (undescribed). A synonym of *S. nutans.*

S. nutans (nodding).* Bluebell; Harebell; Wild Hyacinth. *fl.*, perianth blue, purple, white, or pink, drooping; bracts in pairs; pedicels short, curved, erect in bud and fruit; raceme six to twelve-flowered; scape solitary, tall, stout. April to June. *l.* 10in. to 18in. long, ½in. broad, sub-acute, concave. Western Europe (Britain). SYNS. *S. nonscripta*, *Agraphis nutans*, *Hyacinthus nonscriptus.* See Fig. 448. (Sy. En. B. 1528.) The following are garden forms: *grandiflora alba*, large white; *rosea*, rose; *rubra*, red-flowered.

Scilla—*continued.*

S. odorata (fragrant). *fl.* fragrant; perianth blue, campanulate, ¼in. long, the segments oblong; pedicels ascending, the lower ones 4in. to 6in. long; raceme loose, six to twenty-flowered, 1in. to 2½in. long, 1½in. to 1¾in. broad; scape slender, flexuous, 3in. to 6in. long. May. *l.* three or four, glabrous, 6in. to 9in. long, three to four lines broad, sub-obtuse, channelled down the face, long-narrowed below. Spain and Portugal, 1818. Hardy.

FIG. 448. SCILLA NUTANS.

S. ovatifolia (ovate-leaved). A synonym of *S. lanceæfolia ovatifolia.*

S. pallidiflora (pale-flowered). *fl.*, perianth whitish, tinged with green, campanulate, the segments oblong, sub-obtuse; pedicels straight, the lower ones horizontally spreading, 1in. to 1¼in. long; raceme dense, containing a hundred to a hundred and fifty or more flowers, at first conical, 6in. to 10in. long, 3in. broad; scape erect, 1¼ft. or more long. Spring. *l.* five or six, lorate-lanceolate, ascending, 1ft. to 1¼ft. long, 1in. to 1¼in. broad, glabrous, green. Cape of Good Hope, 1870. Greenhouse. (Ref. B. 179.)

S. patula (spreading). A synonym of *S. hispanica.*

S. paucifiora (few-flowered). *fl.*, perianth greenish, rounded-campanulate, nearly or quite ¼in. long, the segments falcate; pedicels five to six lines long, the lower ones drooping; raceme loose, twenty to thirty-flowered, oblong, 3in. to 4in. long, 1¼in. to 1½in. broad; scape firm, unspotted, terete, 3in. to 4in. long. Spring. *l.* a pair, opposite, or rarely three, spreading, oblong-lanceolate, acute, undulated, 2¼in. to 3in. long, nine to ten lines broad, pale green and spotted on the face, narrowed at base. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 181.)

S. pendula (pendulous). *fl.*, perianth greenish outside, purple within, ½in. long, oblong-campanulate; pedicels very slender, ¾in. to 1½in. long, drooping; raceme rather dense, thirty to sixty-flowered, 3in. to 6in. long, 2½in. to 3in. broad; scape very slender, flexuous, 8in. to 9in. long. Spring. *l.* lorate, 1ft. to 1¼ft. long, about 1½in. broad, acute, narrowed at base, nearly flat, pale green, obsoletely spotted. Cape of Good Hope, 1862. Greenhouse.

FIG. 449. SCILLA PERUVIANA, showing Habit and detached Single Flower.

S. peruviana (Peruvian).* Cuban Lily. *fl.*, perianth lilac, reddish, or whitish, five to six lines long, the segments green-striped; bracts whitish, persistent, solitary, 1in. to 2in. long; raceme very dense, comprising fifty to one hundred or more flowers, at first deltoid, at length 4in. to 6in. long and broad; scape robust, striated, 6in. to 12in. long. May. *l.* six to nine, lorate, 6in. to 12in. long, eight to twelve lines broad, narrowed at base and apex, the margins densely ciliated with minute, white bristles. Mediterranean region, 1607. Hardy. The name of this species has no reference to its native place. See Fig. 449. (B. M. 749.) *alba* is a white-flowered garden form.

S. p. glabra (smooth). *fl.*, perianth lilac; lower pedicels 1½in. to 2in. long. *l.* glabrous on the margins. 1873. *S. Hughii* is a more robust form, having scape, pedicels, and bracts, tinged with red, and leaves 1½in. to 2in. broad.

S. plumbea (lead-coloured). *fl.*, perianth dirty-blue, ¼in. long, campanulate; lower pedicels somewhat spreading, six to eight lines long; raceme fifteen to twenty-flowered, 3in. to 3½in. long, 1½in. to 1¾in. broad. May. *l.* lorate-lanceolate, nearly 1ft. long, 1¼in. broad, acute, glabrous, unspotted. Cape of Good Hope, 1812. Greenhouse. Closely allied to, and perhaps synonymous with, *S. natalensis.* (B. R. 1355.)

S. prasina (green). *fl.*, perianth entirely green or faintly tinged with purple, rounded-campanulate, the segments half a line broad; central pedicels horizontally spreading, ⅛in. long, the lower ones deflexed; raceme rather dense, thirty to fifty-flowered, lanceolate or sub-cylindrical, 1½in. to 2in. long, six to ten lines broad; scape flexuous, deflexed, 3in. to 4in. long. Spring. *l.* five or six, spreading, oblong-lanceolate, 4in. to 5in. long, 1in. to 1¼in. broad, acute, narrowed below, often purple-spotted. Cape of Good Hope, 1870. Greenhouse.

S. pratensis (meadow-loving).* *fl.*, perianth blue, campanulate, two lines long; pedicels four to six lines long, ascending or somewhat spreading; raceme dense, twelve to thirty-flowered, 1½in. to 2½in. long, 1½in. to 1¾in. broad. May. *l.* three to six, glabrous, narrow-ligulate, 6in. to 12in. long, two to four lines broad, attenuated at both ends. Dalmatia, 1827. Hardy. (B. R. 1839, 63.)

S. princeps (princely). *fl.*, perianth greenish outside, reddish-purple within, oblong-campanulate, nearly or quite five lines long, the segments reflexed; pedicels 1in. to 1¼in. long, the central ones spreading, the lower ones drooping; raceme dense, comprising a hundred and fifty to two hundred flowers, 1ft. long, 3in. to 3½in. broad; scapes two or three, 7in. to 9in. long. Spring. *l.* five or six, lorate, 1½ft. to 2ft. long, 2in. to 2½in. broad, acute, narrowed at base, pale green, spotted. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 189.)

S. pumila (dwarf). A synonym of *S. monophylla.*

S. puschkinioides (Puschkinia-like). *fl.*, perianth pale blue, erect, star-like. Spring. *l.* two to four, obtuse, broadly linear. Turkestan, 1881. A pretty, hardy plant, somewhat resembling *S. bifolia* in habit. (R. G. 1051, f. 1.)

S. revoluta (revolute). *fl.*, perianth rose-purple, the falcate segments green-striped at back, rounded-campanulate, ⅛in. long; pedicels spreading, the lower ones six to eight lines long; raceme oblong-lanceolate, loose, twelve to thirty-flowered, 2in. to 3in. long, 1in. to 1¼in. broad; scape very slender, flexuous, 3in. to 6in. long, at first nodding at apex, coloured at base. August. *l.* five to nine, oblanceolate-spathulate, channelled and narrowed at base into a short petiole, 2½in. to 3in. long, six to eight lines broad, slightly wrinkled. Cape of Good Hope, 1774. Greenhouse. SYN. *Drimia lanceæfolia* (L. B. C. 278).

S. sibirica (Siberian).* *fl.* one to three, horizontal or slightly drooping, shortly pedicellate; perianth deep blue, six to seven

Scilla—*continued.*

FIG. 450. SCILLA SIBIRICA, showing Habit and detached Single Flower.

lines long; scapes one to six, fleshy, 3in. to 6in. long. February. *l.* two to four, ascending, narrow, lorate, at length 4in. to 6in. long, four to six lines broad, slightly cucullate. European Russia, Siberia, &c., 1796. Hardy. See Fig. 450. (A. B. R. 355; L. B. C. 151.) SYNS. *S. amœna sibirica* (B. M. 1025), *S. amœnula* (B. M. 2408), *S. uniflora.*

S. socialis (social). *fl.*, perianth greenish, rounded-campanulate, ⅛in. long, the segments falcate; pedicels ⅛in. long, the lower ones drooping; raceme dense, twenty to thirty-flowered, oblong, 1½in. to 2in. long, 1in. broad; scape firm, terete, unspotted, 2in. to 3in. long. Spring. *l.* three or four, spreading, oblong-lanceolate, acute, 2in. to 2½in. long, ¾in. to 1in. broad, slightly narrowed at base, pale glaucous-green and spotted on the face. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 180.)

S. spathulata (spathulate-leaved). *fl.*, perianth greenish outside, purple within, oblong-campanulate, nearly ½in. long; pedicels six to seven lines long, the lower ones drooping; raceme dense, thirty to forty-flowered, 3in. to 4in. long, 1½in. to 1¾in. broad; scape flexuous, 3in. to 4in. long. Spring. *l.* five or six, lorate-spathulate, 6in. to 8in. long, 1½in. to 1¾in. broad, pale glaucous-green, with deeper green and purplish blotches. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 187.)

S. sub-glauca (rather glaucous). *fl.*, perianth greenish outside, purple within, oblong-campanulate, ½in. long; pedicels six to seven lines long, the lower ones drooping; raceme rather loose, thirty to forty-flowered, 3in. to 4in. long, 1½in. or rather more broad; scape spotted, 3in. to 4in. long. Spring. *l.* five or six, lorate-lanceolate, 9in. to 10in. long, 1in. broad, acute, distinctly narrowed at base, pale glaucous-green on the face, purple-spotted at back. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 186.)

S. tricolor (three-coloured). *fl.*, perianth green, the segments oblong; filaments bright mauve-purple; lower pedicels spreading, ½in. or more long; raceme dense, oblong-conical, 2in. to 3in. long, 1¼in. to 1½in. broad; scape flexuous, terete, 6in. to 8in. long. Spring. *l.* six or seven, lanceolate, erecto-patent, glabrous, 1ft. long, 2in. broad, narrowed to 1in. at the channelled base, dark green, blotched on the face with lighter green, and on the back with claret-brown. Port Elizabeth, 1880. Greenhouse.

S. uniflora (one-flowered). A synonym of *S. sibirica.*

S. verna (spring). Sea Onion. *fl.* fragrant; perianth bright blue, ½in. in diameter; bracts as long as the pedicels, or longer; lower pedicels ½in. long; raceme six to twelve-flowered, sub-corymbose or deltoid, ¾in. to 1½in. broad; scapes one or two, shorter than the leaves. April and May. *l.* preceding the flowers, linear, sub-obtuse, 3in. to 10in. long, ⅛in. to ¼in. broad, recurved, concave. Europe (Britain). (Sy. En. B. 1527; F. D. 568, under name of *S. bifolia.*)

S. versicolor (various-coloured). *fl.*, perianth whitish, tinged with green, ½in. long, the segments ligulate, slightly obtuse; anthers blue; lower pedicels at length spreading, 1½in. to 2in. long; raceme rather dense, fifty to eighty-flowered, 6in. to 8in. long, 3½in. broad; scape erect, 6in. to 8in. long. Spring. *l.* six to eight, glabrous, ascending, linear-lorate, 6in. to 9in. long, four to six lines broad, green on both sides, acute and narrowed at apex. Cape of Good Hope, 1872. Greenhouse. (Ref. B. 305.)

S. villosa (villous). *fl.*, perianth blue, ½in. or rather more long, the segments elliptic, rather obtuse; pedicels erecto-patent, the lower ones ¾in. to 1¼in. long; raceme sub-corymbose, six to eight-flowered; scape 2in. to 3in. long. Spring. *l.* three or four, lorate, spreading, 3in. to 5in. long, ½in. to ¼in. broad, ciliated, loosely pilose on the face, channelled below. Barbary, 1831. Hardy. (B. M. 3211.)

S. zebrina (zebra-striped). *fl.*, perianth greenish and purple, rounded-campanulate, ½in. long; pedicels ½in. to ¼in. long, the lower ones drooping; raceme dense, thirty to forty-flowered; scape 4in. to 6in. long, spotted below. Spring. *l.* five or six, ligulate-lanceolate, nearly erect, 8in. to 12in. long, 1in. to 1¾in. broad, acute, slightly narrowed at base, glaucous-green above, below copiously marked with parallel, vertical bars, and towards the base also with horizontal bars, passing into blotches of purple. Cape of Good Hope, 1862. Greenhouse. (Ref. B. 185.)

SCIMITAR PODS. The pods of *Entada scandens.*

SCINDAPSUS (from *Skindapsos*, an old Greek name for an Ivy-like plant). ORD. *Aroideæ* (*Araceæ*). A genus comprising about nine species of tall, robust, climbing, stove shrubs, natives of tropical Asia, the Indian Archipelago, New Guinea, and the Fiji Islands. Flowers all perfect, densely disposed on a sessile, cylindrical, inappendiculate, hermaphrodite spadix; spathe cymbiform, thick, longer than the spadix; peduncle terminal, short, thick. Leaves ovate, oblong, or oblong-lanceolate, acuminate; petioles elongated, sheathing at apex. *S. officinalis*, the only species introduced, requires culture similar to **Caladium** (which *see*). Some of the plants formerly included here are now placed under *Rhaphidophora.*

S. argyræa (silvery). *l.* thickly coriaceous, of a beautiful green, unspotted, or with numerous silvery spots, obliquely cordate-ovate, very inequilateral, 4in. to 6in. long, 2½in. to 3½in. broad, shortly and acutely acuminate, the posterior lobes rounded; petioles 1½in. to 2in. long. Stem climbing, the internodes 3in. to 4in. long. Philippine Islands, 1859. SYN. *Pothos argyræa* (of gardens).

S. officinalis (officinal). *fl.*, spathe green outside, dirty-yellow within, four times as long as the thick peduncle, long-cuspidate; spadix very thick, attenuated at both ends. May. *l.* as long as the petioles, emarginate at apex, ovate-oblong, rounded or loosely cordate-emarginate at base, abruptly long-cuspidate at apex. *h.* 4ft. India, 1820.

S. picta (painted). *fl.*, spathe cuspidate, about 2½in. long; spadix very shortly stipitate, cylindroid; peduncle rather shorter than the petioles. *l.* obliquely oblong, inequilateral, rounded or slightly cordate at base, narrowed at apex into a cusp, coriaceous, dark green above, clouded and irregularly spotted, paler and unspotted beneath, 4in. to 5½in. long. Java.

SCIODAPHYLLUM. *See* **Sciadophyllum.**

SCION. A twig employed for grafting; a young shoot.

SCIOPHYLLA. A synonym of **Maianthemum** (which *see*).

SCIRPEÆ. A tribe of *Cyperaceæ.*

SCIRPUS (the old Latin name used by Pliny, &c., for a Rush). Club Grass or Rush. Including *Holoschœnus* and *Isolepis.* TRIBE *Scirpeæ* of ORD. *Cyperaceæ.* An extensive genus (about 300 species have been quoted) of stove, greenhouse, or hardy, annual or perennial, marsh or water plants, broadly dispersed. Flowers all hermaphrodite, or the upper ones rarely male, several or many to a spikelet; stamens three or fewer; inflorescence variable. Leaves few at the base of the stem, sometimes very long, sometimes small and grass-like, or all reduced to sheaths. Nine species are found in Britain, of which the best-known is *S. lacustris.* This grows freely in any boggy soil; it may be increased by seeds, by suckers, or by divisions. The other species may be similarly treated.

S. Holoschœnus variegatus (Holoschœnus, variegated). *fl.*, spikelets minute, crowded into heads from ⅛in. to ¼in. in diameter; stigmas three. Summer. Stems erect, terete, with alternate zones of whitish and green. A very ornamental, hardy plant. *h.* 1ft. to 1½ft. The green-stemmed type has a wide distribution, and is taller and more vigorous; it occurs on sandy sea-coasts in Europe (North Devon), North Africa, and Siberia.

S. lacustris (stream-loving). Bast; Bullrush. *fl.*, glumes glabrous, mucronate or awned, obtusely two-lobed; spikelets red-brown, one to six, ⅛in. to ¼in. long, sessile; cymes terminal, branched; branches few, ½in. to 3in. long. July and August. *l.* wanting, or short, flat, and keeled in still water, or long and strap-shaped in streams. Stems terete or nearly so, 1ft. to 8ft. high. Arctic Europe (Britain), &c. This plant is extensively used in making chair-bottoms, mats, &c., in most parts of Europe.

S. riparius (riverside-loving). *fl.*, spikes numerous and clustered, in a one-sided, compound, umbel-like panicle, the principal rays of which mostly surpass the involucral leaf; involucellate bracts small, scale-like, and rusty-scarious; scales of the spike rusty- or chestnut-brown, scarious, with a salient midrib extended into a mucronate point. Culm terete, very tall and stout, from a deep running rootstock, naked; the sheaths at the base bearing a short and imperfect leaf, or none. Extra-tropical regions. A favourite plant for conservatory decoration. SYN. *Isolepis gracilis* (of gardens).

S. setaceus (bristly). *fl.*, spikelets one to three, lateral, ⅛in. to ¼in. long, ovoid; glumes green and brown, ovate, obtuse. July

Scirpus—*continued.*

and August. *l.* one or two, narrow, channelled, short and bristly. Stems filiform, 3in. to 6in. long, tufted, rigid. Europe (Britain). This is similar to *S riparius* in appearance. (Sy. En. B. 1594.) SYN. *Isolepis setacea.*

S. Tabernæmontani zebrina (Tabernæmontana-like, striped) Banded Rush. *l.* erect, terete, transversely banded with white and green, generally in nearly equal zones of about half an inch deep. The appearance suggested by a group of the stems is that of a cluster of porcupine quills. *h.* 2ft. to 3ft. Japan, about 1881. SYN. *Juncus zebrinus* (I. H. n. s., 393). The green-stemmed type is found in all temperate climates.

SCISSORS. Scissors are used by gardeners chiefly for thinning the berries in bunches of grapes, and by flower-workers for cutting stems of flowers, &c., when making buttonhole and other bouquets. For this latter purpose the Scissors used should have short, strong blades, and sharp points. Grape Scissors have long blades, tapering to a point, which should not be too sharp, or there is a danger, when using them, of pricking the berries that are to remain. Scissors may be procured in several sizes: a medium size, rather than either extreme, is found most generally useful.

SCITAMINEÆ. A natural order of usually perennial herbs, with creeping rhizomes, broadly dispersed over the warmer regions of the globe. Flowers hermaphrodite or rarely polygamous, irregular, naked or bracteate, spicate, racemose, or panicled; perianth normally double, superior, the outer part calycine, the inner corolla-like, the segments variously connate, or one or other deficient; ovary inferior, three, rarely one or two-celled; stamens sometimes five, equal, free, the sixth deficient or small, often only one perfect, and the rest changed into irregular, polymorphous, variously connate, petaloid staminodes; style terminal, elongated, undivided. Fruit crowned by the persistent calyx, or the whole perianth deciduous, three-celled, or by abortion one or two-celled, sometimes fleshy and indehiscent, sometimes loculidally three-valved; seeds one or many. Leaves variously disposed, the petiole usually forming a sheath, the blade sessile or petiolate above the sheath, often large. Arrow-root, the starch derived from the rhizomes of *Maranta arundinacea*, is recommended for its digestibility. "The root of ginger (*Zingiber officinale*) . . . . is considered in India to be anti-scorbutic and aphrodisiac. . . . . The fruits of *Amomum*, called Cardamoms, are employed as a condiment, and esteemed for their stomachic qualities. . . . . The Banana and Plantain fruits (*Musa paradisiaca* and *M. sapientum*) afford an agreeable, sweet, farinaceous food, and a refreshing drink" (Decaisne and Le Maoût). Several other species are of great economic value. *Cannæ*, *Maranteæ*, *Museæ*, and *Zingibereæ*, are regarded by the authors of the "Genera Plantarum" as tribes of *Scitamineæ*. The order embraces thirty-six genera and about 450 species. Among well-known examples the following may be cited: *Alpinia*, *Canna*, *Curcuma*, *Hedychium*, *Maranta*, *Musa*, and *Zingiber*.

SCIUROIDEOUS. Like a squirrel's tail.

SCLAREA. Included under **Salvia** (which *see*).

SCLERANTHUS (from *skleros*, hard, and *anthos*, a flower; alluding to the indurated perianth). Knawel. ORD. *Illecebraceæ*. A genus comprising about ten species of small, weedy herbs, distributed throughout Europe, East Asia, Africa, Australia, and New Zealand. *S. annuis*, and its variety *biennis*, and *S. perennis*, are British plants.

SCLERIA (from *skleria*, hardness; alluding to the indurated fruit). Nut Rush. ORD. *Cyperaceæ*. A large genus (about 100 species) of stove, greenhouse, or hardy, dwarf or tall herbs, broadly dispersed over tropical and sub-tropical regions, and extending as far as temperate North America. Flowers unisexual; spikelets small, often fascicled; hypogynous bristles none; bracts at the base of the cyme or panicle leafy. Leaves sometimes grass-like and flaccid, sometimes long, broad, and plicate-nerved.

Scleria—*continued.*

Of the few species introduced, two examples are here described. Both are hardy. For culture, *see* **Cyperus.**

S. ciliata (hair-fringed). *fl.*, sterile spikes large, many-flowered; clusters terminal; sheaths pubescent June to August. *l.* two, narrow-linear, rigid, smooth, or with scattered hairs on the margins. Culms slender, rigid, 1½ft. to 2ft. high, smooth below, sparingly fringed on the angles above. South United States, 1823.

S. verticillata (whorled). *fl.*, spikes small; clusters four to six, erect, scattered near the summit of the culm, forming an interrupted spike. June and July. *l.* narrow-linear or filiform, smooth. Culms very slender, 6in. to 12in. high, smooth. North America, 1825.

SCLEROGEN. "The hard matter deposited by some plants in the interior of their cells, as in those forming the shell of the walnut" (Lindley).

SCLEROID. Hard.

SCLERONEMA. A synonym of **Xeronema** (which *see*).

SCLEROPTERIS. A synonym of **Cirrhæa** (which *see*).

SCLEROTHAMNUS (from *skleros*, hard, and *thamnos*, a shrub; alluding to the rigid aspect of the bush). ORD. *Leguminosæ*. A monotypic genus, now included, by Bentham, under *Eutaxia*. The species is a very ornamental, glabrous, divaricate or diffuse, greenhouse, evergreen shrub. For culture, *see* **Chorizema.**

S. microphyllus (small-leaved). *fl.* yellow, small, on axillary pedicels; calyx having acute or acuminate lobes; standard ¼in. or more long; petals shorter, the keel deeply coloured. May. *l.* usually elliptic-oblong or linear, one to three lines long, rigid, concave, obtuse or almost acute. Branches rigid, sometimes short and ending in slender spines, sometimes elongated, slender, and erect. Australia, 1803. The proper name of this shrub is *Eutaxia empetrifolia.*

SCLEROTIA (from *skleros*, hard). Small, hard bodies, produced by many Fungi belonging to various groups. They exhibit variations in size, colour, and form, but agree in being made up of very closely interwoven mycelium. The outer layer of the Sclerotium is peculiarly dense, and is formed of hyphæ so adherent to one another, and with so many cross walls, as to resemble true parenchyma in appearance. Sclerotia vary considerably in size, from the minute *S. cepævorum* (which gives rise to *Mucor subtilissimus* on Onions), resembling a grain of gunpowder, to the size of a large pea in the Sclerotia of some Agarics. They are usually

FIG. 451. SCLEROTIUM OF PEZIZA POSTUMA (natural size), with two Cups on slender stalks.

round or oval (see Fig. 451), but may be irregularly lobed or elongated, as in *Ergot* of Rye. Many are black, or nearly so; others are brown, dull yellow, or white. By their texture, they are fitted to withstand extremes of temperature, and of drought or moisture, better than ordinary mycelium; and it is by means of them that many Fungi are preserved through the winter. A considerable number of Sclerotia make their appearance only on dead parts of plants in a state of decay, *e.g.*, the very common *S. semen* (like a small pea, at first white, then changing to black), which produces *Typhula*; or in dung, *e.g.*, *S. stercorarium*, from which *Coprinus stercorarius* is developed. But

Sclerotia—*continued.*

several are formed on living plants. Among these are the following: In Potato stems, the Sclerotium from *Peziza postuma* is produced; on most herbaceous stems *S. durum* appears in long, black ridges or warts, from which arises a mould (*Polyactis cinerea*), followed, after a time, by *Peziza Fuckeliana*; *S. cepævorum*, which produces *Mucor subtilissimus* on Onions; *S. clavus*, the Ergot of grasses, from which *Claviceps purpurea* is developed; and a Sclerotium which fills the berries of *Vaccinium Myrtillus*, and gives origin to *Peziza* (*Sclerotinia*) *baccarum*. Sclerotia are not themselves a cause of disease in plants, but are organs by which disease-producing Fungi are propagated. When any cultivated plants are attacked by Fungi that produce Sclerotia, the only safe method of treatment is to burn all parts that bear the latter, to prevent the spread of disease the following year.

SCLEROXYLON. A synonym of **Myrsine** (which *see*).

SCOBIFORM. Resembling sawdust.

SCOLIOSORUS. Included under *Antrophyum.*

SCOLOCHLOA. A synonym of *Arundo.*

Scolopendrium—*continued.*

pairs of similar lateral ones; veins usually once forked. *sori* oblique, ⅛in. to ¼in. long, one line broad. Philippines. Greenhouse.

S. rhizophyllum (rooting-fronded). *sti.* 1in. to 4in. long, naked, compressed, chestnut-brown below. *fronds* 4in. to 9in. long, lanceolate, from an auricled cordate base, the point tapering out, and frequently rooting. *sori* short, irregular, linear-oblong. North America. See Fig. 452.

S. vulgare (common). Burnt Weed; Christ's Hair; Common Hartstongue. *rhiz.* very stout, often scaly (as well as the stipes and midrib). *sti.* very stout, 4in. to 8in. long. *fronds* 6in. to 18in. long, broadest in the middle, flaccid, bright green; basal lobes usually auricled, converging; margins undulated; midrib stout. *sori* parallel, at right angles to the midrib, very variable in length and number. Europe (Britain). SYN. *S. officinarum.*

The following are some of the best marked varieties of this species:

S. v. acrocladon (branch-tipped). *fronds* very distinct, narrow-linear, crested and branched at the apex.

S. v. claphamii (Clapham). *fronds* forked and crested at the apex, laciniate and lobed on the margins.

S. v. columnare (columnar). *fronds* having the rachis fringed with a narrow, wing-like membrane, leaving only a dense, multifid head. *h.* 6in.

S. v. Coolingii (Cooling's). A form about 4in. broad and high, much branched. The plant is almost spherical in shape.

S. v. crispum (curled). *fronds* 1ft. to 1½ft. long, always barren under cultivation; margins crenated and undulated, imparting a handsome, frilled appearance. There are many forms of this variety, the most important of which are: *fertile*, *latum*, and *minus.*

FIG. 452. ROOTING FROND OF SCOLOPENDRIUM RHIZOPHYLLUM.

SCOLOPENDRIUM (the ancient Greek name of the genus, used by Theophrastus; it was said to be so-called because the numerous parallel lines of fruit resemble the feet of the Centipede, or *Scolopendra*). Hartstongue. Including *Antigramme*, *Camptosorus*, and *Schaffneria.* ORD. *Filices.* A genus comprising about nine species of interesting, stove, greenhouse, or hardy ferns, inhabiting temperate and tropical regions. Sori attached to the veins, oblique with regard to the midrib, or occasionally almost parallel with it, linear or oblong; involucres arranged in pairs, and open towards each other. The species thrive on rockwork; they will also succeed in shady situations, where scarcely any other plant would live. Of *S. vulgare*, the common British Hartstongue, a multitude of varieties are grown in gardens, and present a wonderful series of interesting variations from the normal state of the plant. The best known species and varieties are described below; except where otherwise indicated, all are hardy. For general culture, *see* **Ferns.**

S. Hemionitis (Hemionites-like). Mule's Fern. *sti.* 4in. to 6in. long, slender, slightly fibrillose. *fronds* 4in. to 6in. long, oblong-lanceolate, hastate-cordate at base, with short and rounded, or prominent and almost acute, lobes. South Europe, 1779.

S. Krebsii (Krebs'). A form of *Lomaria punctulata.*

S. officinarum (officinal). A synonym of *S. vulgare.*

S. pinnatum (pinnate). *sti.* compressed, greyish. *fronds* 2ft. to 4ft. long, with an entire terminal pinna, 4in. to 6in. long, and 1½in. to 2in. broad, proliferous at the point, and one to six

S. v. cristatum (crested). *fronds* branched at the apex, the branches again forked, thus forming a large crest. See Fig. 453.

FIG. 453. SCOLOPENDRIUM VULGARE CRISTATUM.

The form *lato-digitatum* has digitately-branched fronds, and irregularly-laciniate and wavy divisions. See Fig. 454.

Scolopendrium—*continued.*

S. v. densum (dense). A remarkable form, about 3in. high, having the fronds very much branched, so that the plant resembles a green ball, studded over with innumerable points, something like curled parsley. 1882.

S. v. laceratum (torn). *fronds* beautifully crested and curled at the tips, forming large, crisp heads.

FIG. 454. FROND OF SCOLOPENDRIUM VULGARE LATO-DIGITATUM.

S. v. marginatum (margined). *fronds* about 1ft. long, having on the under side, near the margin, a continuous, raised line, which often produces thorn-like processes. A very elegant and distinct variety.

S. v. multifidum (much-cut). *fronds* much-branched and forked at the apex, forming a very handsome, crested head.

S. v. Stansfieldii (Stansfield's). This mainly differs from *crispum* in that the fronds are peculiarly fringed on the edges and crested at the apex. It is a very striking variety.

SCOLYMUS (the old Greek name, used by Theophrastus and other writers as far back as Hesiod). ORD. *Compositæ*. A small genus (three species) of hardy, erect, annual, biennial, or perennial herbs, natives of the Mediterranean region. Flower-heads yellow, terminal or lateral, sessile; involucre ovoid or sub-globose, the few-seriate bracts mucronate or spiny at apex, gradually passing into floral leaves; receptacle conical or elongated; florets ligulate, truncately five-toothed at apex. Leaves alternate, rigid, sinuate-toothed or pinnatifid, with spiny teeth or lobes, often white-spotted above. The roots of *S. hispanicus* are equally as good as *Scorzonera;* the leaves and stalks are eaten as Cardoons by the people of Salamanca; the flowers are employed for the adulteration of Saffron. *S. maculatus* is sometimes cultivated for the sake of its spotted, variegated leaves; seeds of this species only require sowing in the open ground. The perennial and biennial species thrive in common soil, and may be increased by seeds, or by divisions.

S. grandiflorus (large-flowered).* *fl.-heads* solitary, usually terminal; bracts sub-verticillate. May. *l.* slightly villous, decurrent, winged. Stem villous. *h.* 3ft. Mediterranean region, 1828. Perennial.

S. hispanicus (Spanish). Golden Thistle; Spanish Oyster Plant. *fl.-heads* bibracteate, sub-aggregate, in leafy spikes. August. *l.* decurrent, slightly glabrous, winged. *h.* 3ft. South-west Europe, 1653. Biennial. (S. F. G. 825.)

Scolymus—*continued.*

S. maculatus (spotted). *fl.-heads* somewhat corymbose, many-bracted; bracts pectinate. July. *l.* cartilaginous on the margins, decurrent, winged, often white-spotted. Stem simple, glabrous. *h.* 3ft. South Europe, 1630. Annual. (S. F. G. 824.)

SCOLYTIDÆ. An extensive group of small Beetles, often known as "Bark-beetles," because the larvæ of by far the greater number of species feed between the wood and the bark of trees, especially when the trees are dying. The insects, when mature, come out through holes in the bark. They are not, however, the only Beetles that feed in bark; but probably in no other family do so many species possess this habit. They are distinguished by their small size and cylindrical form

FIG. 455. SCOLYTUS GEOFFROYI, (*a*) natural size and (*b*) magnified.

(see Fig. 455), fitting them for their mode of life. They have four joints in each foot, the first joint being decidedly shorter than the next three together. The head is usually narrow, and occasionally it is lengthened into a beak, as in Weevils. The antennæ are clubbed. The colour is almost always some shade of dark grey or brown. The Beetles, after pairing, burrow through the bark, and form below it passages, which are usually straight or nearly so. The females lay eggs along the sides of the passages formed by each pair; and the larvæ, on hatching out from the eggs, burrow away from the main passages, taking the directions least likely to bring them into the burrows of one another. As they grow, they increase the width of their burrows to correspond with their own size, and when full-fed they become pupæ in the ends of the tubes; and from these they emerge as Beetles in the following spring. A considerable number of species have been found in Britain. Of these, some are confined to one kind of tree, while others feed in several different kinds. Most trees are liable to the attacks of several species of these Beetles; and *Coniferæ*, especially Scotch Firs, are peculiarly infested by them. Each species makes tunnels so definite and characteristic in form that a practised entomologist can generally recognise, from the marks in the bark and the wood, the species of Beetle that has

FIG. 456. MARKINGS ON INNER SURFACE OF ELM-BARK OF GALLERIES FORMED BY SCOLYTUS GEOFFROYI (the wide gallery running up the middle is formed by the Female Beetle, the narrow side ones by the Larvæ).

made them (see Figs. 456 and 457). The family *Scolytidæ* has been split up into a number of genera, minor characters being employed for this purpose; but upon these it is unnecessary now to enter, since their habits, the

Scolytidæ—*continued.*

injuries done by them to trees, and the means of preventing or combating their attacks, are much alike in all the species. Fortunately, they seldom appear in quite healthy trees; but if trees have been weakened by any cause (*e.g.*, unfavourable soil, or gases in the soil or in

FIG. 457. ELM TRUNK (much reduced), from which the Bark has been removed from one side to show the Galleries formed by *Scolytus Geoffroyi*.

the atmosphere), their destruction is often completed by these insects in a short time. Examples of this are frequently seen in the destruction by them of Elms and of other trees in public promenades in large towns (*e.g.*, in Paris).

Remedies. The beetles prefer dying or dead wood in which to breed; hence, all such trees should be removed without delay, or, if the trunks are too large to be removed, the bark ought to be torn off and burned. It is well to leave some dead trunks as traps, since the

FIG. 458. OLD BARK OF ELM, showing Holes pierced by *Scolytus Geoffroyi*.

beetles resort to them in preference to living trees, and the logs can be burned with the insects in them. These traps should be renewed about every month during the breeding season, in summer. Where trees show holes (see Fig. 458), the bark should be removed from the infested

Scolytidæ—*continued.*

parts about the end of June. In a short time the larvæ will be dead, and most of them will have been removed by birds. Choice trees may be protected by saturating the outer bark with tobacco solution, or other applications distasteful to the beetles, about the breeding season. The more destructive species in Britain are as follows: On Elms, in avenues, &c., *Scolytus Geoffroyi* (also called *S. destructor* (see Figs. 455 to 458), *S. pygmæus*, and *Hylesinus vittatus*; on Ash, *Hylesinus crenatus* and *H. Fraxini*; on Birch, *Scolytus Ratzeburgi* and (in the wood) *Bostrichus domesticus*; in Beech-wood, *B. domesticus*; on Scotch Firs and other Conifers, *Hylesinus poligraphus, Bostrichus chalcographus, B. typographus, B. Laricis, B. suturalis, B. bidentatus, B. micrographus, B. lineatus, B. cinereus, Hylesinus angustatus, H. palliatus, H. atra, H. piniperda. Scolytus Pruni*, on the Continent, occasionally proves hurtful to fruit-trees, *e.g.*, Apple and Pear.

SCOLYTUS. A genus of **Scolytidæ** (which *see*).

SCOOPS. Tools employed for levelling or rendering smooth the bottoms of drains, when preparing for the drain-pipes. They are usually provided with long handles, and made in several widths, both hollowed and flattened in the sole part, intended for scooping out the soil. Some have the point of the Scoop turned on an angle towards the workman when in use; others turn in the opposite direction.

SCOPARIA (from *scopa*, a broom; the plants may be used for sweeping purposes). ORD. *Scrophularineæ*. A genus comprising five or six species of much branched herbs or small shrubs, natives of Mexico and South America, one being broadly dispersed over all warm regions. Flowers white, yellow, or pale bluish, rather small, on axillary or twin pedicels; calyx four or five-parted; corolla four-cleft. Leaves opposite or whorled, entire or toothed, dotted. Two species have been introduced—*S. dulcis* (Sweet Broom) and *S. flava*—both herbaceous; but they are probably lost to cultivation.

SCOPOLIA (named in honour of John Anthony Scopoli, 1732-1788, Professor of Natural History at Pavia, and author of botanical works). SYN. *Scopolina*. Including *Anisodus* and *Whitleya*. ORD. *Solanaceæ*. A small genus (three species) of hardy, erect, scarcely branched, perennial herbs; one is European, the second Japanese, and the third Himalayan. Flowers lurid-purple or greenish, veined, nodding; calyx truncate or broadly and shortly five-lobed; corolla ample, the limb five-angled or very shortly five-lobed; stamens five; pedicels solitary, filiform. Leaves membranous, entire. Two of the species have been introduced. They thrive in a light, dry soil, and in a shady situation. Propagation may be effected by division of the roots. *S. carniolica* is a very desirable plant, on account of its pretty flowers being produced in spring.

S. carniolica (Carniolan).* *fl.* ⅔in. long, solitary, axillary, nodding; corolla lurid-red, yellow or green within; peduncles ⅔in. to 1¼in. long. April. *l.* entire, petiolate, 3in. to 5½in. long, ovate or obovate-oblong, sub-cuspidate; petioles ½in. long. *h.* 1ft. or more. Russia, &c., 1780. (B. M. 1126, under name of *Hyoscyamus Scopolia.*)

S. lurida (lurid). *fl.* axillary; corolla at first green, then yellowish, at length purplish; peduncles ½in. to 2in. long. September. *l.* petiolate, ovate, acute, undulated, wrinkled, the larger ones 6in. to 7in. long, mostly unequal, g'abrous above, slenderly-tomentose and canescent beneath. *h.* 4ft. to 6ft. Nepaul, 1824. (S. B. F. G. 125, under name of *Whitleya stramonifolia.*)

SCOPOLIA (of Smith). Included under **Toddalia** (which *see*).

SCOPOLINA. A synonym of **Scopolia** (which *see*).

SCORDIUM. Included under **Teucrium** (which *see*).

SCORIAS. A synonym of *Carya*.

SCORODONIA. Included under **Teucrium** (which *see*).

SCORPIOID. "A form of unilateral inflorescence which is circinately coiled in the bud; in the stricter sense, a form with the flowers two-ranked, these being thrown alternately to the right and left" (Asa Gray).

SCORPION GRASS. A common name for *Myosotis*.

SCORPIURUS (from *scorpios*, a scorpion, and *oura*, a tail; alluding to the twisted form of the legumes). Caterpillar Plant. ORD. *Leguminosæ*. A genus comprising about half-a-dozen species of hardy, nearly stemless or decumbent herbs, natives of South Europe, North Africa as far as the Canary Isles, and Western Asia. Flowers yellow, often small, solitary or umbellate on axillary peduncles, nodding. Pods sub-terete, tubercled or muricated, circinate-involute. Leaves simple, entire, continuous with the petioles. The species are not very beautiful, and are rarely cultivated in this country. *S. vermiculata* is a trailing annual. Seeds should be sown in the open border, during spring, and the young plants treated as other hardy annuals.

FIG. 459. FRUITING BRANCHLET AND DETACHED POD OF SCORPIURUS VERMICULATA.

S. vermiculata (worm-shaped-podded). *fl.* solitary on the peduncles; standard streaked with red. June and July. Pods thick, glabrous, with the inner ribs almost obsolete, but the ten outer ones bear crowded stipitate tubercles, which are obtusely dilated at apex. *l.* tapering into the petioles. 1621. See Fig. 459.

SCORZONERA (from old French *scorzon*, Catalonian *scurzon*, a serpent; in allusion to the cooling, anti-febrile effects of *S. hispanica*, which was formerly employed in Spain, on account of these properties, for the cure of serpent bites). Viper's Grass. Including *Podospermum*. ORD. *Compositæ*. A large genus of hardy, glabrous, floccose-woolly, or hairy, perennial or rarely biennial or annual herbs. About 120 species have been described; but probably the number entitled to that rank is less than 100; they inhabit Europe, North Africa, and Central and Western Asia. Flower-heads yellow or purple, often rather large, on long peduncles; involucre cylindrical or campanulate, with imbricated, acute or acuminate bracts in many series; receptacle naked or

Scorzonera—*continued.*

foveolate; florets ligulate, truncately five-toothed at apex; achenes linear, sub-terete, or the outer ones angular, glabrous or villous. Leaves alternate, sometimes entire and grass-like or broader, sometimes more or less pinnately lobed or dissected. *S. hispanica* is cultivated in gardens for the use of its long, tapering roots, which are cooked in a similar way to those of Salsafy. Their outside skin is black; but the inside flesh is white. Seeds should be sown at the end of March, or any time during April, in drills 1ft. apart, and the plants, when large enough, thinned to 6in. or 8in. asunder. An open situation is preferable, and deep soil, which should not be newly manured for the crop. The roots will be ready for use in November, and on through the winter. Some should be lifted before frost sets in, and stored in sand, in a cool shed, to be ready for use whenever required. All the other species may be grown from seeds, sown in the open border, in spring, and the seedlings afterwards thinned out. The perennials may be increased by division of rootstocks, either in autumn or just when growth begins in spring.

The species best known to cultivation are described below; except where otherwise stated, they are perennials.

S. coronopifolia (Buckhorn-leaved). *fl.-heads* yellow, one to a stem; involucral scales mucronate, the outer ones ovate. June and July. *l.* lanceolate, mostly pinnatifid; lobes linear, unequal. Stems erect, nearly simple, leafy at base. *h.* 1ft. North Africa, 1818.

FIG. 460. SCORZONERA HISPANICA.

S. hispanica (Spanish).* Common Viper's Grass. *fl.-heads* yellow; involucre oblong, the scales slightly glabrous, acuminated. June to September. *l.* amplexicaul, lanceolate, undulated or slightly toothed, glabrous or somewhat pubescent. Stem branched; branches naked, one-headed at apex. Root nearly the shape of a carrot, but smaller and dark-coloured,

Scorzonera—*continued.*

pure white internally, of a sweet and agreeable flavour. *h.* 3ft. South Europe, &c., 1576. See Fig. 460.

S. laciniata (torn). *fl.-heads* yellow; involucral scales slightly hooked at the apex. June and July. *l.* pinnatisect; lobes linear, entire. Stems sub-erect, naked and one-headed at the apex. *h.* 2ft. South Europe, 1640. Biennial.

S. mollis (soft). *fl.-heads* yellow, the rays purplish beneath; involucre, as well as the elongated, sub-corymbose peduncles, woolly-villous. June and July. *l.* linear-subulate, keeled, woolly-villous; old ones nearly glabrous; young ones undulately crisped on the margins. *h.* 1½ft. Caucasus, 1818. (B. M. 3027.)

S. purpurea (purple). *fl.-heads* purplish; involucre cylindrical, the scales broadly lanceolate, not ciliated; achenes smooth. May and June. *l.* linear-subulate, channelled, triquetrous. Stems branched, two to five-headed. Root cylindrical-fusiform. *h.* 2ft. Eastern Europe, &c., 1759. (J. F. A. 35.)

S. p. grandiflora (large-flowered). A more showy and much stouter plant than the type, with larger flowers. (B. M. 2294.)

S. p. rosea (rosy). *fl.-heads* rose-pink; involucral scales lanceolate, acuminate; achenes sulcate, muricated above. July. *l.*, radical ones elongated, linear-lanceolate, flat, glabrous; cauline ones few, carinate-linear. Stems simple, one-headed. *h.* 1½ft. Eastern Europe, &c., 1807.

S. undulata (undulated).* *fl.-heads* purplish-rose, 2in. to 2½in. in diameter; involucre cylindric, white-downy; peduncles slender, green or purplish. July. *l.*, radical ones nearly 1ft. long, narrowly linear-lanceolate, entire, rather long-petiolate, with a yellow midrib; cauline ones 3in. to 6in. long, gradually narrowed from a broad, sessile base to a very fine point. Stem 1ft. to 2ft. high, slender, branched. Algeria and Morocco, 1874. (B. M. 6127.)

SCOTCH BONNETS. A common name for *Marasmius oreades.*

SCOTCH PINE. *See* **Pinus sylvestris.**

SCOTCH PRIMROSE. A common name for *Primula scotica.*

SCOTTEA (named in honour of R. Scott, M.D., Professor of Botany in Dublin). ORD. *Leguminosæ.* A monotypic genus, now included, by Bentham, under *Boissæa.* The species and its varieties are elegant, greenhouse, evergreen shrubs, thriving in sandy peat. Propagated freely by cuttings of the young wood, inserted in sand, under a glass.

S. dentata (toothed). *fl.* orange-red or yellow, more or less tinged with green, on solitary pedicels; calyx ¼in. to ⅓in. long, with short, obtuse teeth; standard ¼in. to ⅜in. long; keel and wings over ⅜in. long; bracts broad and rigid, but very deciduous. Summer. *l.* opposite, varying from broadly ovate-cordate or triangular to hastate-lanceolate or almost linear, ½in. to 1in. long, acute or obtuse, irregularly denticulate. *h.* 3ft. to 7ft. Australia, 1803. (L. B. C. 1458.)

S. d. angustifolia (narrow-leaved). *l.* hastate-lanceolate to almost linear; margins revolute. 1825. (B. R. 1266, under name of *S. angustifolia.*)

S. d. hastata (halberd-shaped). *l.* ovate-hastate or hastate-lanceolate, ⅜in. to above 1in. long, ¼in. to ½in. broad. 1833. (B. 134 and B. R. 1233, under name of *S. dentata*; B. R. 1652, under name of *S. lævis.*)

SCRAPERS. Scrapers of some description should be placed in various positions in gardens, particularly at points where there are paths cut in the ordinary soil joining others with a gravel surface. It matters little what sort is used if they are securely fixed into blocks of wood to keep them firm.

SCREENS. A shrubbery or belt of fast-growing trees is termed a Screen, when planted for affording shelter to a garden, an orchard, or any separate part of a garden requiring protection from an unfavourable quarter. Gardens on the sea-coast invariably need a shelter or Screen from the wind and salt spray; this is generally provided by planting a belt of trees or shrubs that are known to succeed in such situations. The term also denotes anything erected or grown to hide an unsightly object from any particular point, such as from one of the principal walks in a garden. This may be done effectually, if only to a moderate height, by lattice-work, with Ivy or other creepers trained upon it, and more extensively by free-growing trees and evergreen shrubs. There are numerous methods of forming Screens;

Screens—*continued.*

some are of general application, but there are many instances where special preparations have to be made to meet peculiar local requirements.

SCREW PINE. *See* **Pandanus.**

SCREW-TREE. A common name for *Helicteres.*

SCROBICULATE. Marked by tiny depressions.

SCROFULA-LEAF, or **SCROFULA-WEED.** A name applied to *Goodyera pubescens.*

SCROPHULARIA (so named in reference to its former supposed benefit in cases of scrofula, owing to the resemblance of the roots of some species to scrofulous tumours). Figwort. ORD. *Scrophularineæ.* A genus comprising about 120 species (which number may, according to Bentham and Hooker, be reduced to 100) of mostly hardy, often fœtid, annual, biennial, or perennial herbs or sub-shrubs, broadly dispersed over the extra-tropical regions of the Northern hemisphere. Flowers greenish-purple, lurid-purple, or yellow, generally rather small, in paniculate, thyrsoid cymes; calyx deeply five-cleft or five-parted; corolla tube ventricose, globose or oblong; lobes five, short and flat, the four upper ones erect, the lowest spreading; perfect stamens four, the fifth usually rudimentary. Leaves opposite, or the upper ones alternate, entire, cut, or dissected, often pellucid-dotted. *S. aquatica* (Brook or Water Betony, &c.), *S. nodosa* (Murrain Grass, &c.), and *S. Scordonia*, are natives of Britain, while *S. vernalis* has become naturalised. Few of the species have any horticultural value. Only one calls for mention here. It thrives in ordinary garden soil, as a pot plant, in a cool frame, and may be multiplied by seeds.

S. chrysantha (golden-flowered).* *fl.* ½in. long, drooping; corolla golden-yellow, ovoid, turgid, contracted at the mouth; cymes densely packed in the upper leaf axils, forming a rounded head 2in. in diameter. March. *l.* 2in. to 3in. broad, ovate- or orbicular-cordate, lobulate and toothed, convex, wrinkled. *h.* 6in. to 18in. Caucasus, &c., 1882. A stout, erect biennial. (B. M. 6629.)

SCROPHULARINEÆ. A natural order of herbs, sub-shrubs, shrubs, or small trees, found in all climates, but mostly in temperate regions. Flowers hermaphrodite, often irregular; calyx inferior, persistent, with five, rarely four, teeth or lobes; corolla gamopetalous; limb of five or four, very rarely six or eight, equally spreading lobes, or more or less bilabiate, with the upper lip entire, emarginate, or bilobed, and the lower one trilobed and often spreading; stamens often four, didynamous, or two, alternating with the corolla lobes; anthers two-celled, sometimes one-celled by the confluence of the sutures across the top of the connective; inflorescence variable. Capsules variable, dehiscent, or rarely baccate and indehiscent. Leaves, in a few genera, all alternate, in most cases the lower ones (or all) opposite or whorled, the upper and floral ones often alternate, entire, toothed, or rarely variously lobed or dissected; stipules none. Many of the species are of medicinal value: chief among these is the Foxglove. The order is a most important one from a horticultural standpoint, contributing, as it does, so many beautiful plants to our gardens. It embraces, according to Bentham and Hooker, 157 genera and nearly 1900 species, and is divided by those authors into twelve tribes: *Antirrhineæ, Aptosimeæ, Calceolareæ, Cheloneæ, Digitaleæ, Euphrasieæ, Gerardieæ, Gratioleæ, Hemimerideæ, Leucophylleæ, Manuleieæ,* and *Verbasceæ.* Among the many well-known genera, the following may be cited as examples: *Antirrhinum, Calceolaria, Chelone, Digitalis, Mimulus, Pentstemon,* and *Verbascum.*

SCROTIFORM. Pouch-like.

SCRUBBY OAK. *See* **Lophira africana.**

SCRUB OAK. *See* **Quercus Catesbæi.**

SCURF. A condition often met with in Potato tubers, in which the surface shows clefts or slits, beneath which lie black masses of rotting tissue. Observation of the cause shows this to be, in part at least, the presence of superfluous moisture in the soil. This favours greatly the production of what are known as lenticels, or small groups of loosely-arranged cells below the stomata. These loose cells increase, and readily absorb water from the exterior. The swelling bursts the outer skin of the tuber, forming the slits, and giving still more free access to water. Cork is formed to repair the injury; but is also burst by increased growth of the lenticel, and is renewed to repair the injury as far as possible. The cells saturated with moisture begin to decay, and offer a favourable occasion of entrance to the spores of Fungi; hence, in a short time, the tissues below the slits become blackened and soft, the cells show Fungus threads, and the starch is removed from the neighbouring cells. Even where the actual amount of material destroyed is small, the unsightly appearance of the tubers frequently lessens the value of the crop. The best remedy is good drainage, together with efficient means to loosen the soil, and to permit free access of air.

The term "Scurf" is also applied to the loose, scaly matter on the epidermis.

SCURFY PEA. *See* **Psoralea.**

SCURVY GRASS. *See* **Cochlearia officinalis.**

SCUTATE, SCUTIFORM. Having the form of a small, round buckler.

SCUTELLARIA (from *scutella*, a dish or platter; alluding to the form of the fruiting calyx). Helmet Flower; Skull-cap. SYN. *Cassida*. ORD. *Labiatæ*. A genus comprising about ninety species of stove, greenhouse, or hardy, annual or perennial herbs or sub-shrubs, decumbent or diffuse, rarely erect and tall, very rarely shrubs; they are scattered over temperate regions and the tropical mountains. Flowers blue, violet, yellow, or white, solitary or in pairs, axillary or in terminal spikes or racemes; calyx campanulate, two-lipped, the tube dilated opposite the posterior lip into a broad, flattened, hollow pouch, both lip and pouch deciduous in fruit, the anterior lip closed after flowering, persistent; corolla tube long, naked inside; limb bilabiate, the upper lip entire or notched, the lower dilated, its lateral lobes free and spreading, usually connate with the upper lip, rarely with the lower; stamens four. Nutlets sub-globose or depressed. Leaves often toothed, sometimes pinnatifid or entire; floral ones conformed or changed into bracts. *S. galericulata* and *S. minor* are the British representatives of the genus. The species described below are, for the most part, very handsome when in flower, and hence are well suited for ornamenting the front of flower borders. Any common garden soil is usually suitable. The herbaceous species may be increased by seeds, or by divisions; and the shrubby kinds may be readily multiplied by cuttings. *S. Mociniana* is one of the most beautiful of stove, flowering plants, and may be easily grown by anyone with a cool stove or warm greenhouse temperature. The bunches of flowers are freely produced —one on the point of almost every shoot—and are very bright and effective. Cuttings of half-ripened shoots root readily in spring, or at almost any season, in a warm propagating-frame. Young plants should have their points pinched out once or twice when growing, to encourage a bushy habit, and so insure a much larger production of flowers. Nice little specimens may be grown in 5in. pots. They succeed best in loam and leaf soil or decayed manure, with some sand intermixed. Except where otherwise indicated, the species here given are hardy, herbaceous perennials.

S. albo-rosea (white-and-rose). *fl.* borne in long, terminal racemes; corolla lilac, becoming paler towards the base of the long tube. Summer. *l.* ovate-oblong, cordate at base, undulated.

Scutellaria—*continued.*

Stem tetragonal. *h.* 1½ft. Woods of the upper Amazons, 1859. Stove shrub. (I. H. 584.)

FIG. 461. SCUTELLARIA ALPINA.

S. alpina (alpine).* *fl.* in oblong, tetragonal spikes; corolla wholly purple or with the tube or lower lip yellow, 1in. to 1½in. long. August. *l.* sub-sessile or shortly petiolate, ovate, slightly acute, rounded or cordate at base, loosely-crenate, serrate, six to ten lines long, pubescent or pilose; floral ones coloured, imbricated. Stems procumbent, often rooting at base. Europe and Central Asia, 1752. See Fig. 461. (A. F. P. 26, fig. 3; B. R. 1460; S. B. F. G. 90.) The variety *lupulina* has entirely yellow flowers. (B. R. 1493, under name of *S. lupulina*.)

S. aurata (golden-flowered). *fl.* numerous, erect, in a terminal raceme; corolla yellow, very long, tubular-infundibuliform; pedicels short; bracts linear, reflexed. Summer. *l.* on rather long petioles, ovate, obtuse, acuminate, auriculate-cordate at base, the lobes approximate, entire, or obsoletely and remotely denticulate. Stem tetragonal. *h.* 1ft. to 1½ft. Brazil, 1863. Stove perennial. (I. H. 1862, 368.)

S. a. sulphurea (sulphur-coloured). *fl.* of a pale sulphur-colour, smaller than in the type. (B. M. 5525.)

S. Columnæ (Columna's). *fl.* opposite, secund; corolla dark purple, ten to twelve lines long, loosely pubescent outside, the throat dilated; pedicels as long as the fruiting calyx; racemes 6in. or more long, loose, slightly branched, pilose. July. *l.* petiolate, ovate, 2in. long, crenate, broadly cordate or truncate at base, scarcely wrinkled, slenderly pubescent; floral ones ovate. Stem erect, 2ft. to 3ft. high, branched, pubescent. South Europe, 1806. (S. B. F. G. 52.)

S. costaricana (Costa Rica).* *fl.* numerous, racemose, subsecund; calyx (and pedicel) dark purple, small; corolla of a rich golden-scarlet, the inside of the lips a deep yellow, 2½in. long, erect, tubular-infundibuliform. June. *l.* ovate, acuminate, serrate-dentate; petioles rather long. Stem dark purple, erect. *h.* 1½ft. to 3ft. Costa Rica, 1863. A beautiful stove perennial. (B. M. 5439.)

S. galericulata (skull-cap). *fl.* secund, pubescent, solitary; corolla blue, variegated with white inside, ¾in. long, the tube curved; bracts leaf-like; pedicels very short. July to September. *l.* shortly petiolate, ½in. to 2½in. long, oblong or ovate, cordate at base, obtuse or sub-acute, rather remotely crenate-serrate. Stems 6in. to 18in. long, slender, simple or branched. Europe (Britain), &c. (Sy. En. B. 1060.)

S. grandiflora (large-flowered). *fl.* in tetragonal, oblong spikes, which are eventually 1½in. long; corolla purplish, smaller than in *S. orientalis*. July. *l.* long-petiolate, somewhat roundish-ovate, incised-toothed, softly tomentose beneath or on both sides; floral ones entire, imbricated, pubescent. Stems procumbent. Altaian Alps, Siberia, 1804. (B. M. 635.) SYN. *S. pulchella*.

S. Hartwegi (Hartweg's).* *fl.* scattered, in loose, simple racemes; corolla bright red, 1in. long, with a violet lower lip. Summer. *l.* ovate, slightly acuminate, unequally crenate-serrate, roundly

Scutellaria—*continued.*

truncate or loosely cordate at base, green above, purple, and puberulous on the veins, beneath; petioles puberulous. *h.* 1ft. to 2ft. Quito, 1882. A very ornamental, stove sub-shrub. (B. M. 6615.)

S. incarnata (flesh-coloured). *fl.* in terminal, secund spikes; calyx tubular, compressed; corolla flesh-coloured or pale reddish-violet, pubescent, six times longer than the calyx, with a spreading limb. Summer. *l.* petiolate, ovate, deeply serrated, 1in. to 3in. long, intense green, pubescent above, tomentose beneath; floral ones linear-lanceolate, equalling the pedicels. Stem erect, 2ft. high, pubescent. Central America, 1856. Stove perennial. (B. M. 4268.)

S. i. Trianai (Triana's). This variety chiefly differs from the type in the much richer rose-scarlet of its corolla, and in the smaller, glabrous foliage. (B. M. 5185.)

S. japonica (Japanese). *fl.* opposite, loose; calyx slightly pilose; corolla blue, six to eight lines long, pubescent; racemes loose-flowered, 6in. long. Summer. *l.* petiolate, ovate, obtuse, deeply crenate, rounded or truncate at base, glabrous; lower ones 1½in. long; floral ones gradually becoming smaller. Stems prostrate at base; branches ascending. Japan. (P. M. B. x. 123.)

S. Lehmanni (Lehmann's). *fl.* bright red-scarlet, disposed in short, terminal racemes. Summer. *l.* cordate, petiolate. Stems erect. *h.* 1ft. to 2ft. Columbia, 1884. An ornamental stove perennial. (R. G. 1152, fig. 1, a-c.)

S. macrantha (large-flowered). *fl.* opposite, secund; calyx pilose; corolla blue, 1in. long, the tube much dilated upwards, the hood incurved; racemes many, simple. August. *l.* sessile, lanceolate, obtuse, entire, nearly glabrous, ciliated; floral ones longer than the calyx. Stem procumbent at base, ascending, often purplish, nearly glabrous. Eastern Asia, 1827. (B. M. 4420.)

S. minor (lesser). Hedge Hyssop. *fl.* pale pink-purple, ⅛in. long. July to October. *l.* shortly petiolate or sessile, ⅛in. to 1in. long, obtuse, with one or two crenatures near the base; upper ones quite entire. *h.* 4in. to 6in. Europe (Britain), &c. Habit resembling *S. galericulata*, but smaller. (Sy. En. B. 1061.)

S. Mociniana (Mocini's).* *fl.* opposite, secund; calyx one-sixth the length of the corolla; corolla showy, bright scarlet, 1½in. to 1½in. long, with the inside of the lip yellow and the tube clothed with short, fine hairs, the limb erect. Summer. *l.* petiolate, ovate, sub-sinuate-crenate, slightly hispid above, nearly glabrous beneath; lower floral ones conformed, the upper ones small, oblong. *h.* 1½ft. Mexico, 1868. A very beautiful stove shrub. (Gn., Sept. 1, 1877; I. H. 562; R. H. 1872, 350.)

S. orientalis (Oriental).* *fl.* in oblong, tetragonal spikes; corolla yellow, or with the lower lip fuscous or purplish, 1in. to 1½in. long. August. *l.* petiolate, ovate, incised-toothed, four to ten lines long, hoary beneath; floral ones entire, membranous, slightly imbricated. Stems creeping, and often rooting from the base, ascending, slenderly cano-tomentose. South Europe and Central Asia, 1729. (B. M. 2120; S. B. F. G. 45.)

S. parvula (rather small). *fl.*, calyx as long as the pedicels; corolla violet, pubescent, twice or thrice the length of the calyx. Summer. *l.* ovate, or the uppermost ones ovate-lanceolate, sessile by a truncate or slightly cordate base, about ¼in. long, some of the lower ones with one or two coarse teeth, the lowest slender-petiolate. Roots tuberous. *h.* 4in. to 10in. North America, 1822. Plant branching from the base, usually erect. (H. E. F. 106.)

S. pulchella (pretty). A synonym of *S. grandiflora.*

S. purpurascens (purplish). *fl.* in terminal, loose racemes; corolla ⅔in. long, the tube and upper lip bright blue, the lower lip dark violet with a median white stripe. Summer. *l.* on long petioles, broadly ovate, obtuse, sinuate-crenate, very broadly truncate, rounded, or sub-cordate at base, slightly hispid above, or glabrous on both sides. *h.* 1ft. to 2ft. South America, 1880. A useful, decorative, greenhouse perennial. (B. M. 6464.)

S. serrata (serrated). *fl.*, corolla blue, fully 1in. long, nearly glabrous, with a narrow tube, a moderately ampliate throat, and a rather narrow upper lip; raceme simple or rarely a pair of racemes at the base of the terminal one. August. *l.* three to five pairs, ovate or ovate-oblong, coarsely and sharply serrated, acute or acuminate, mostly acute at the base, 2in. to 4in. long; upper floral ones entire and lanceolate. Stem 1ft. to 2ft. high. North America, 1800. (A. B. R. 494.)

S. splendens (splendid).* *fl.* scattered; corolla scarlet; ten to eleven lines long, the tube elongated, slender, the lobes shortened; racemes simple, elongated. October. *l.* petiolate, broadly ovate, obtuse or scarcely acuminate, 4in. to 5in. long, deeply cordate at base, hairy on both sides; floral ones minute. Stems ascending, branched, hairy or pubescent. *h.* 1ft. Mexico, 1841. Stove perennial. (B. M. 4290, under name of *S. cordifolia.*)

S. Ventenatii (Ventenat's). *fl.*, calyx small; corolla scarlet, elongated, many times longer than the calyx, the upper lip deeply four-cleft; bracts very deciduous, narrow, the lower ones sub-ovate; racemes terminal, elongated, sub-secund or sub-distichous. August. *l.* long-petiolate, rather thick, cordate-ovate, somewhat obtuse, deeply-serrated. *h.* 1½ft. Santa-Martha, 1844. An erect, branched, softly pubescent, greenhouse perennial. (B. M. 4271.)

Scutellaria—*continued.*

S. villosa (villous). *fl.* glandular-villous; corolla scarlet, the tube elongated, slenderly funnel-shaped, the lobes shortened; bracts small; racemes terminal, many-flowered, short, corymbose. July. *l.* petiolate, cordate-ovate, soft, acuminate, deeply sinuate-toothed, wrinkled, pilose, purple beneath. Stems acutely tetragonal, branched. *h.* 1½ft. Peru, 1842. Stove shrub. (B. M. 4789; F. d. S. 961.)

SCUTELLIFORM. Platter-shaped.

SCUTICARIA (from *scutica*, a whip; alluding to the shape of the leaves). ORD. *Orchideæ.* A small genus (two species) of stove, epiphytal orchids, one Brazilian, the other a native of Guiana. Flowers very handsome; sepals sub-equal, erecto-patent, the lateral ones adnate with the foot of the column forming a prominent chin; petals rather smaller; lip sessile, articulated, broad and concave, the lateral lobes large, erect, the middle one small and spreading; pollen masses four; scapes one-flowered, growing from the sides of the stem. Leaves very long, fleshy, sub-terete, furrowed, continuous with the stem. Stems very short, fleshy, one-leaved, at length scarcely fleshy-thickened. The species thrive either on blocks or in baskets with sphagnum. During the growing season an abundance of water must be supplied to the roots. Propagation may be effected by divisions, made as growth is commencing.

S. Hadwenii (Hadwen's). This is the correct name of the plant described in this work under name of *Bifrenaria Hadwenii.*

S. Steelii (Steel's).* *fl.* primrose-yellow, with reddish-brown blotches, large, fragrant; lip marked with brownish-crimson, especially on the lateral lobes, the crest having three orange-coloured teeth in front; scape one to three-flowered. *l.* one on each branch of the ebulbous rhizome, terete, 2ft. to 4ft. long, channelled, tapering to a fine point. British Guiana, 1834. SYN. *Maxillaria Steelii* (B. M. 3573; B. R. 1986; W. O. A. ii. 55).

SCUTULA. A synonym of **Memecylon** (which *see*).

SCYPHANTHUS. A synonym of **Grammatocarpus** (which *see*).

SCYPHULARIA. Included under **Davallia** (which *see*).

SCYTALIA. Included under *Nephelium.*

SCYTALIS. A synonym of **Vigna** (which *see*).

SCYTANTHUS (of Hooker). A synonym of **Hoodia** (which *see*).

SCYTHES. Since the introduction of mowing machines, these have not been so extensively used in gardens. The ordinary form of handle and blade answers well for mowing grass where no machine is kept, and also for cutting it where a machine cannot conveniently be worked. A Scythe for lawn-mowing should be "hung" differently from those used amongst long field-grass. The stick and handles should be attached so that the edge of the blade may be slightly raised above ground when the back is resting on the ground. The workman should be careful to avoid, so far as possible, what is called "ribbing"—that is, mowing so as to show the marks of the Scythe after the grass has been swept up and taken away. This is scarcely possible unless the blade has been properly attached to the handle for the special purpose of cutting short lawn-grass.

SEA BEET. A common name for *Beta maritima.*

SEA BELLS. A common name for *Calystegia Soldanella.*

SEA BUCKTHORN. *See* **Hippophæ.**

SEAFORTHIA. A synonym of **Ptychosperma** (which *see*). The plant so well known in gardens as *S. elegans* is *Ptychosperma Cunninghamiana. S. coronata, S. Kuhlii,* and *S. malaiana,* are garden names of *Pinanga coronata, P. Kuhlii,* and *P. malaiana* respectively.

SEA HEATH. *See* **Frankenia.**

SEA HOLLY. A popular name for *Eryngium maritimum* and other species.

SEA KALE (*Crambe maritima*). A hardy, herbaceous perennial, a native of Britain. It is very extensively cultivated in gardens as a vegetable for forcing, and for use in spring when the season's growth commences. The young shoots and leaf-stalks are the parts cooked when they are crisp and well blanched. The stronger these can be obtained, the better; the chief object is, therefore, to cultivate with a view to securing good, large roots and crowns previous to forcing them. Sea Kale may easily be raised from seed, which should be sown in an open situation at the end of March, or early in April, according to the state of the soil. Sow in drills 12in. apart, and thin the young plants to about 6in. asunder in the rows for the first year. Before the next spring, the roots must be lifted, and replanted in rows from 2ft. to 2½ft. apart, for growing into a size large enough for use. All the crowns and buds at the top must be cut off before replanting, and the roots inserted so that their tops are 1in., or even 2in., below the surface. Sometimes, Sea Kale is sown at wider distances than those above given, and the plants allowed to grow for two years without being transplanted, when the tops may be blanched and used; but when thus treated the tops of the crowns must be cut off, to prevent the plants seeding the second year. The greater part of the Sea Kale plants grown specially for forcing are raised from cuttings made from the roots. When a quantity of fully-developed

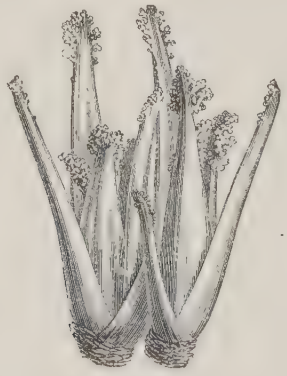


FIG. 462. SEA KALE.

crowns are lifted for forcing, there are plenty of pieces to be detached from the main root; these are sometimes called thongs, and any about 4in. in length will do for planting. They should be cleanly cut through with a knife, the upper end straight, and the lower or smaller end on an angle, in order that each may be readily distinguished at planting time, which will be in the following March, or early in April. Meanwhile, during winter, these prepared root-cuttings must be buried in a heap of sandy soil. All the larger roots that have been forced may also be cut over and replanted, but it is advisable to keep growing some young ones each year. The roots covered with soil will have been forming shoots by early spring all round the crowns; they should be planted about 1ft apart, in trenches, which require to be 2ft. asunder, to allow the leaves to develop. The crown portion of the cutting must be placed so as to be covered with soil. The numerous shoots which appear may, in due course, be reduced to one, the strongest; this will then grow rapidly, if the soil is rich and of good depth. After the leaves die away in autumn, the roots, if intended for forcing under glass, may be lifted, covered temporarily with soil, and protected until required for introducing into heat. During this process, any pieces of roots large enough for cuttings may be collected and treated for another year in the way

Sea Kale—*continued.*

above described. Root cuttings taken from plants that have not been forced are much stronger and superior to those saved from forced and, consequently, weakened stocks.

Forcing. Sea Kale is one of the easiest of plants to force, provided heat is very gradually applied: it will not withstand a high temperature at first. An easy method, where a supply of crowns has been prepared, is to place several nearly close together in large pots, and stand them in a temperature of about 45deg., turning an empty pot over the top, to exclude light. The floor of a mushroom-house is generally a good place, and, as this structure is usually kept dark, the shoots become blanched as they grow without being covered. They should be cut for use when at the stage represented in Fig. 462, and detached at the crown as shown. Sea Kale may also be forced in the ground by inverting over it large pots specially made for the purpose, and covering with fermenting material. A gradual heat is necessary, a very little at first is sufficient to excite growth. Light must always be excluded during the forcing process, in order to insure thorough blanching.

SEA LAVENDER. A popular name for various species of *Statice.*

SEAL-FLOWER. A common name for *Dicentra spectabilis.*

SEA MILKWORT. *See* **Glaux.**

SEA PINK. *See* **Armeria.**

SEA ROCKET. *See* **Cakile.**

SEASIDE GRAPE. *See* **Coccoloba.**

SEASIDE GROUNDS AND PLANTS. The Seaside, as generally understood, is the coast-land immediately adjoining the sea, and, consequently, exposed to the influences of strong sea-breezes, and, with these, plenty of salt spray. Both have their evil effect on trees, and, with some exceptions, on plant-life generally; but as Seaside residences are so numerous, and most of them have some sort of a garden attached, it may be of service to note some of the trees and plants best suited for protecting and rendering them attractive. On exposed parts of the sea-coast it is invariably necessary to plant, so far as may be practicable, a screen or broad belt of trees and shrubs that are sure to be capable of withstanding the exposure, and eventually affording protection for more tender subjects. Hurdles have to be placed round plants during winter, and numerous other contrivances resorted to for affording protection. Plants which, perhaps, thrive well just out of the reach of the salt spray may, and often will, succumb when exposed to it; and the wind may blow on certain points with great violence, while a short distance off it may seldom be seriously felt. The arrangement of Seaside Grounds should, therefore, be in the hands of someone with a knowledge of the locality, and of the amount of exposure that preparation has to be made for contending against. A screen of trees and shrubs is usually much better than a wall for a protection; the wind passes over the latter with destructive violence, while its force becomes, as it were, lost on a mass of foliage. It is, however, often as much of a difficulty to get screen-plants established as it is those which are intended to be screened because of being tender or more ornamental. Only small or moderate-sized specimens should be inserted, even for forming screens, or they will be rocked about by the wind before the roots can get a hold, and, consequently, will not answer permanently.

Some of the trees and shrubs most likely to succeed in very exposed situations on the sea-coast are: *Euonymus japonicus*, *Tamarix gallica* (a most valuable and exceedingly hardy plant for forming screens), *Escallonia*

Seaside Grounds and Plants—*continued.*

macrantha, Phillyreas, Berberries, Cotoneasters, thick-leaved Rhododendrons, Evergreen Oak (*Quercus Ilex*), Elders, the Sea Buckthorn (*Hippophae rhamnoides*), Gorse (*Ulex Europæus*), Ivies, thick-leaved Hollies, Willows, common Junipers, *Rosa spinosissima*, *R. rubiginosa* (Sweet-briar), *R. rugosa*, &c. Amongst Pines, the hardiest are *P. austriaca*, *P. Laricio*, and *P. Pinaster*.

SEASIDE PLUM. *See* **Ximenia americana.**

SEASIDE POPPY. *See* **Glaucium flavum.**

SEA STARWORT. *See* **Aster Tripolium.**

SEA THRIFT. *See* **Statice Limonium.**

SEATS. As resting-places in the pleasure-grounds, park, and woods of a gentleman's domain, Seats are always necessary adjuncts; for the croquet-ground, cricket-ground, &c., they are indispensable. In the gardens of the suburban villa, and of the cottage, they are alike in request. Seats may be of classic design, the work of the sculptor and architect, upon the nobleman's terrace; logs of wood, placed informally at the base of some large tree, in the park; a simple rustic plank, with a more or less grotesque back rail formed of crooked branches, for the shrubbery and the woods. But, as a rule the above are not admissible into dressed grounds. The inventive faculties of manufacturers of garden furniture have of late years placed within the reach of all classes a variety of Seats much more enjoyable and convenient than the uncomfortable rustic Seats of former times.

Most of the large furnishing ironmongers, in the principal towns, supply Seats suitable for the margins of walks, croquet-grounds, and other places (where a considerable number of persons require accommodation), that will each afford rest to from six to eight persons; some of these have a back to shut down over the Seat to keep it dry—the "Windsor," the "Osborne," and the "Sandringham," are good examples — others are fitted with awnings, and very ingenious mechanism for opening and closing the same at pleasure. In some, the "awning" forms a screen at the back: by this contrivance persons using the Seat are secured from the chill east winds that prevail in spring and early summer, and which often render the employment of an open Seat dangerous to health. The awnings also form an agreeable screen from the scorching sun at a later period. These Seats, whilst the most desirable, are not out of keeping in any position in the pleasure-grounds. The framework of the Seats above described is of iron, having laths of pitch pine or other durable wood bolted on to form the seat and back; the whole is painted or stained and varnished.

Of chairs, there is an almost endless variety; most of them are very light, and easy to transfer from place to place as occasion may require. They are framed of iron, with wood laths, as described above, or with light steel spring laths, which are more yielding than the wood. Some are made with elbow rests, some to fold up, and others to rock. The names given to these, in the trade, are "Desideratum," "Gwyder," "Spring lounges," "French spring chairs," &c. It is desirable that this class of garden furniture should be carefully stored in a dry loft or out-house, during the winter months, as its beauty very much depends upon the perfect state of the paint and varnish, and in the spring, when taken out, any defects should be attended to.

The Seats fitted with awnings, as already described, are movable; but others, of a more permanent kind, may often find a place, and will form, not only a very comfortable retreat, but also an agreeable feature in the scenery. Should a boundary wall require masking, a bench, say from 10ft. to 12ft. long, may be fixed against it. Over it a pitched roof may be constructed of boards supported on rustic posts at a convenient

Seats—*continued.*

height, and covered with rough bark or thatch, the ends being closed with boards, also covered with bark, or rough trellis work, and a floor constructed with pebbles or blocks of wood. The wall at the back should be lined with India matting, and a Rose or Honeysuckle trained over the structure, the width of which may be from 3ft. to 5ft. Similar Seats, but constructed independently of a wall, with bark or thatch coverings, may be erected in the more distant parts of the grounds, woods, &c., as shelters in case of sudden showers. In such places, they should have a closely-boarded back and ends, covered with rough bark or heather, and the structure should be flanked by shrubs. Cold draughts should be prevented from entering at the back of the Seat, by stuffing all crevices with moss, and, if a greater degree of ornamentation is desired, patterns in hazel rods or mosses may be worked on the inside surfaces.

SEAWEEDS. "A general term for the plants comprehended in the order *Algæ* of the Linnæan class *Cryptogamia*, known as flowerless plants. It includes not only plants growing in the sea, as the name Seaweed implies, but also in fresh water, and on moist earth, rocks, stone, and living and diseased vegetable substances, in the form of slime and jellies" (Smith).

Seaweeds are very largely used as manure in many districts around the British coasts, and in the Channel Islands, and are much esteemed for this purpose, owing to their richness in the foods required by plants, and to their rapid decay after being dug or ploughed into the ground. They are regarded as peculiarly useful in promoting the growth of Potatoes, and also as beneficial to Turnips; in fact, they especially assist the growth of plants that contain a good deal of water in their tissues when mature. Besides the Seaweeds themselves, the masses of them employed as manure have usually mixed up among them a good deal of decaying animal matter, from dead sea-animals on or in the plants, and this adds considerably to their value. They are very rich in Potash and Soda compounds, but rather poor in Phosphates; hence, it is well to mix with them some bone-dust, or other manure rich in Phosphates, before spreading them on the soil. *See also* **Manures.**

SEBÆA (named after Albert Seba, 1665-1736, an apothecary and botanical author, of Amsterdam). ORD. *Gentianeæ*. A genus comprising about eighteen species of stove or greenhouse, erect, annual herbs, natives of tropical and Southern Africa, Madagascar, Australia, and New Zealand. Flowers whitish or yellow, rather small, numerous, in corymbose cymes, or rarely few or solitary and long-pedicellate, or sub-sessile on the branches; calyx four or five-cleft or parted; corolla tube cylindrical, at length swollen, the lobes four or five, spreading, twisted; stamens four or five, the filaments short. Leaves sessile or stem-clasping, often small. The three species introduced are elegant plants. They require to be raised on a hotbed, and afterwards planted out in a warm, sheltered border, at the end of May.

S. albens (white). *fl.* whitish; sepals obtuse, connivent, striated; corolla lobes elliptic, obtuse, nearly equalling the ample, cylindrical tube. August. *l.* cordate-oblong. *h.* 6in. South Africa, 1820.

S. aurea (golden). *fl.* golden-yellow; calyx five-parted; corolla lobes elliptic-oblong, equalling the tube; stigma clavate; cymes dichotomous, many-flowered. July. *l.*, lower ones cordate-triangular; upper ones ovate or lanceolate, all obtuse. *h.* 6in. South Africa, 1824.

S. ovata (ovate). *fl.* yellow; calyx five-parted, the segments ovate-lanceolate; corolla lobes ovate, slightly acute, one-half the length of the tube. August. *l.* ovate and somewhat rounded at base, slightly obtuse. *h.* 6in. Australia, 1820.

SEBESTENS. The fruits of *Cordia latifolia* and *C. Myxa*.

SECALE (the ancient name used by Pliny, &c., said to have been derived from *seco*, to cut). ORD. *Gramineæ*. A small genus (two species, or varieties of one) of

Secale—*continued.*

hardy, annual, erect grasses, broadly dispersed over the Mediterranean region. Flowers in a dense, terminal spike. Leaves flat. *S. cereale* (Rye) as a corn crop in this country is gradually diminishing by the substitution of wheat.

SECAMONE (altered from *Squamona*, the Arabic name of *S. ægyptiaca*). ORD. *Asclepiadeæ*. A genus comprising about two dozen species of stove, twining or decumbent, much-branched shrubs or sub-shrubs, natives of tropical and South Africa, tropical Asia and Australia, and the Mascarene Islands. Flowers small, often minute; calyx five-parted; corolla tube shortly rotate, deeply five-cleft; coronal scales five, shortly or deeply connate with the staminal tube; cymes loosely bi- or trichotomous, or clustered and few-flowered, sessile or shortly pedunculate. Leaves opposite, coriaceous or membranous, sometimes pellucid-dotted. Three species have been introduced, but they are probably lost to cultivation.

SÉCATEUR. An instrument used for pruning, extensively in France, and also, of late, in this country. Sécateurs are small, hand pruning-shears; there are various forms of them made. They can be used much more expeditiously than a pruning-knife for shortening summer shoots, pruning Roses, &c.; but they do not make a clean cut like a knife. *See also* **Pruning-Knives.**

SECHIUM (said to be derived from *sekos*, a pen or fold; the fruit being sometimes used for fattening hogs in the West India Islands.) SYN. *Chayota*. ORD. *Cucurbitaceæ*. A monotypic genus. The species is a half-hardy, slightly hispid, climbing, perennial herb. The fruits are commonly employed as an article of food by the natives of the West Indies, being considered extremely wholesome; they are occasionally sent to England in a fresh state, and are sold in our markets under the name of Chayotes. The plant is grown in South Europe and in tropical Africa and America. For culture, *see* **Gourds.**

S. edule (edible). Chaco, Chayota, or Chocho Plant. *fl.* yellow, monœcious, disposed in elongated racemes, sub-fasciculate, shortly pedicellate; corolla rotate, deeply five-parted. June. *fr.* fleshy, about 4in. long, obovoid, oblong, or pear-shaped, sulcate, one-seeded. *l.* membranous, cordate, angled or lobed. Stems annual. Root large and fleshy, sometimes weighing nearly 20lb., resembling a yam in appearance, and having a similar flavour when cooked. *h.* 6ft. to 12ft. Native country unknown. 1816. (G. C. 1865, 51.)

SECRETION. Any organic, but unorganised, substance produced in the interior of plants.

SECTILE. Cut into small pieces: *e.g.*, the pollen masses of some *Orchideæ*.

SECTION. A term generally applied, in classification, to a division in the arrangement of species, genera, or other groups.

SECUND. Turning to one side.

SECURIDACA (from *securis*, a hatchet; alluding to the form of the wing at the end of the pod). ORD. *Polygaleæ*. A genus comprising about twenty-five species of stove, often climbing shrubs, mostly natives of the warmer parts of America, but four or five inhabit tropical Asia or Africa. Sepals unequal, the two largest petaloid and wing-like; two lateral sepals adnate to the staminal tube towards the base, erecto-connivent; keel concave-galeate, erect, or broadly three-lobed; stamens eight; racemes terminal and axillary, often panicled. Leaves alternate, usually entire and biglandular. The two species described below are pretty plants, thriving in a compost of loam, peat, and sand. Propagated readily by cuttings, inserted in sand, under a glass, in heat.

S. erecta (erect). *fl.* red, in dense, panicled racemes; posterior sepals spathulate, blunt; wings orbicular, equalling the shortly bilobed keel. July. *l.* 1½in. to 2in. long, ovate-lanceolate, ovate, or oblong, pointed or blunt, puberulous beneath. *h.* 10ft. to 15ft. Tropical America, 1824. An erect shrub.

S. virgata (twiggy). *fl.* variegated, odorous, distant; corolla yellow; wings rosy on the outside, white within; racemes terminal, filiform, drooping. July. *l.* eight to ten lines in diameter, rounded at both ends or sub-emarginate; those of the flowering branchlets much smaller. West Indies, 1739. A high climber.

SECURIDACA (of Gærtner). A synonym of **Securigera** (which *see*).

SECURIGERA (from *securis*, a hatchet, and *gero*, to bear; referring to the shape of the pods). SYNS. *Bonaveria*, *Securidaca* (of Gærtner). ORD. *Leguminosæ*. A monotypic genus. The species is a hardy annual, only requiring to be sown in the open border in spring.

S. Coronilla (Coronilla-like). Axe-weed; Hatchet Vetch. *fl.* yellow, at the tips of axillary peduncles, nodding; petals free of the staminal tube; standard sub-orbiculate. July. *l.* impari-pinnate; leaflets entire; stipules small, membranous. *h.* 1ft. South Europe, &c., 1562. (S. F. G. 712, under name of *Coronilla Securidaca*.)

SECURINEGA (from *securis*, a hatchet, and *nego*, to refuse; in reference to the extreme hardness of the wood). Including *Geblera*. ORD. *Euphorbiaceæ*. This genus embraces about eight species of stove, greenhouse, or hardy, branched shrubs, inhabiting temperate and tropical regions. Flowers monœcious or dicœcious, apetalous, glomerate at the axils; males small, numerous, subsessile; females fewer or solitary. Leaves alternate, entire, often small. Only one species calls for description here, and it is doubtful if that is still cultivated. It thrives in any rich, loamy soil. Propagated readily by cuttings of the half-ripened wood, inserted in sand, under a glass, in heat.

S. Commersoni (Commerson's). A synonym of *S. durissima*.

S. durissima (very hard-wooded). Otaheite Myrtle. *fl.* white; males sub-sessile; females at length somewhat spreading, reflexed; calyx silky-pubescent. June. *l.* usually oblong-ovate, acute, shortly narrowed into the petioles. *h.* 35ft. Mauritius, &c., 1793. Stove. This is the *Bois dur* of the colonists. SYNS. *S. Commersoni*, *S. nitida*.

S. nitida (shining). A synonym of *S. durissima*.

SEDGES. A common name for the *Cyperaceæ*, of which *Carex* is the principal genus.

SEDUM (from *sedeo*, to sit; alluding to the manner in which the plants fix themselves on rocks and walls). Orpine; Stonecrop. Including *Rhodiola*. ORD. *Crassulaceæ*. A genus comprising about 120 species of mostly hardy, glabrous or glandular-pubescent, fleshy, erect or

FIG. 463. INFLORESCENCE OF SEDUM.

decumbent, sometimes tufted or Musk-like herbs, rarely sub-shrubs, nearly all natives of the temperate and frigid regions of the Northern hemisphere; they are rare in America; one is found in Peru. Flowers white or yellow,

Sedum—*continued.*

rarely pink or blue, cymose (see Fig. 463), in a few cases axillary and solitary; calyx four or five-lobed; petals four or five (rarely six or seven), free; stamens eight to ten (rarely twelve to fourteen); filaments filiform or subulate. Leaves very variable, opposite, alternate, and whorled, entire or serrate, rarely laciniate. Sedums are amongst the easiest of plants to grow; like Saxifrages and Sempervivums, they succeed in almost any position, on rockwork, old walls, or ruins, or in the mixed border. Some are specially adapted for use in carpet bedding, *S. lydium* being an example. *S. acre*, and its variety *aureum*, though common, are plants much favoured by almost everybody, and allowed to spread extensively. *S. spectabile* is a fine, herbaceous border plant, also equally well adapted for pot culture. All Sedums are readily propagated by seeds, by cuttings, or by division of the tufts in spring. They prefer an open, loamy soil, and to grow amongst stones, but, as before noted, they thrive in almost any position.

By the assistance of the following key, adapted from Dr. Masters' admirable monograph on the "Hardy Stonecrops" (published in the "Gardeners' Chronicle" for 1878), any of the hardy species may be readily identified.

I. Herbaceous Perennials.

Flowers unisexual: *S. Rhodiola.*

Flowers bisexual.

Leaves narrow, entire, toothed, or deeply divided: *S. Aizoon, S. asiaticum, S. Maximoviczii, S. Middendorffianum, S. quadrifidum, S. rhodanthum, S. Selskyanum, S. Semenovii, S. trifidum.*

Leaves flat, broad, toothed, but never deeply divided (TELEPHIUM group): *S. erythrostictum, S. maximum, S. spectabile, S. telephioides, S. Telephium.*

II. Evergreen Perennials.

Leaves flat and broad.

Leaves wholly, or at least those on the barren shoots, in tufts or rosettes: *S. Beyrichianum, S. Nevii, S. obtusatum, S. spathulifolium, S. ternatum, S. umbilicoides.*

Leaves scattered, not tufted.

Stems erect: *S. populifolium.*

Stems, at least the barren ones, prostrate, creeping.

Flowers yellow: *S. hybridum, S. japonicum, S. kamtschaticum.*

Flowers pink, rose-coloured, or white: *S. Anacampseros, S. Ewersii, S. oppositifolium, S. Sieboldi, S. stoloniferum.*

Leaves thick, more or less terete.

Leaves sharply pointed.

Flowers yellow or greenish-yellow: *S. amplexicaule, S. anopetalum, S. nicæense, S. pruinatum, S. reflexum, S. rupestre, S. sarmentosum, S. stenopetalum.*

Flowers lilac or white: *S. pulchellum.*

Leaves blunt at the tip.

Flowers yellow: *S. acre, S. Hildebrandi, S. sexangulare.*

Flowers white or pink: *S. album, S. anglicum, S. arboreum, S. brevifolium, S. dasyphyllum, S. farinosum, S. glaucum, S. lydium, S. monregalense, S. multiceps.*

III. Annuals or Biennials.

Stamens ten to twelve.

Leaves flat, tufted on the barren shoots: *S. sempervivoides.*

Leaves more or less cylindrical: *S. cæruleum, S. glandulosum.*

A selection of the best-known species is given below; they are hardy, herbaceous perennials, except where otherwise indicated. For most of the descriptions we are indebted to the monograph above quoted.

S. acre (bitter). Wall Pepper. *fl.* yellow, numerous, ¼in. across; sepals like the leaves, half the length of the lanceolate, spreading petals; cymes one-sided, two to five-forked; flower-stems erect, 2in. to 3in. high. Summer. *l.* minute, ⅛in. to ¼in. long, crowded, thick, conical, obtuse, gibbous at base, having an acrid taste; those on the flower-stems scattered. Barren stems creeping, branched, about 2in. long, slender-cylindrical, rooting near the base. Europe (Britain). Plant glabrous, evergreen. See Fig. 464. (Sy. En. B. 532.) The commonest British species, of which the following varieties are worth notice:

S. a. aureum (golden).* *l.* and tips of the shoots bright golden-yellow in spring. This charming variety is admirably suited for spring bedding, or for giving colour at a dull time of the year.

Sedum—*continued.*

S. a. elegans (elegant). *l.*, young ones and tips of the shoots of a pale silvery colour. This is not so effective as *aureum*, and is more delicate.

S. a. majus (large). *fl.* ⅜in. across; sepals linear-oblong, slightly gibbous at base; petals twice the length of the sepals; cyme two-parted, with a central sessile flower, the branches recurved, one-sided. *l.* in seven rows, closely crowded, thick, deltoid-ovoid, scarcely auricled at base. Plant larger and more robust than the type. A distinct plant, regarded by Dr. Masters as "perhaps even deserving of specific rank."

S. Aizoon (Aizoon).* *fl.* yellow, numerous, ½in. in diameter, in a loose, panicled cyme, 1in. to 3in. in diameter; lower peduncles axillary, distant; upper ones umbellate, flat-topped. Late summer. *l.* distant, sessile, alternate, 2½in. by ⅜in., oblong-lanceolate, coarsely and irregularly toothed for the greater part of their length; midrib prominent. Stems glabrous, 1ft. or more high, sub-angular, several from the same crown, erect, unbranched. Siberia, &c., 1757. An old inhabitant of our gardens.

FIG. 464. SEDUM ACRE.

S. albicans (whitish). A garden form of *S. Telephium.*

S. album (white).* *fl.* white, nearly ½in. across; petals lanceolate, spreading, twice the length of the calyx; cymes 2in. to 3in. in diameter, corymbose, much-branched, many-flowered; flower-stems pinkish, erect, 4in. to 6in. high. Summer. *l.* alternate, spreading, ½in. long, linear-oblong, obtuse, contracted at base. Barren shoots erect or creeping, rooting, terete, olive-brown, sometimes slightly tubercled. Europe (Britain). Plant glabrous, tufted, evergreen, handsome when in flower. (Sy. En. B. 529.) SYNS. *S. farinosum* and *S. neglectum* (of gardens). The following are varieties:

S. a. brevifolium (short-leaved). *l.* shorter and thicker than in the type.

S. a. micranthum (small-flowered). *fl.* smaller than in the species. *l.* on the barren shoots ascending, not spreading, flattened on both surfaces.

S. a. teretifolium (terete-leaved). *fl.*, sepals and petals obtuse. *l.* much flattened above. (Sy. En. B. 529.)

S. amplexicaule (stem-clasping). *fl.* golden-yellow, numerous, secund; sepals furrowed outside; petals ¼in. long, keeled, twice the length of the sepals; cymes two-forked, leafy, with a solitary flower in the fork; flower-stems decumbent, ascending, 6in. to 9in. long. Summer. *l.* dilated and membranous at base, tapering to a long, awl-shaped point; those of the flower-stems alternate, ascending, sessile, ½in. long. Branches 2in. to 4in. long, wiry, ascending, clothed with imbricating leaves. Mediterranean region. A curious, glabrous, evergreen species. The ends of the shoots swell out into small, scaly tubers.

S. Anacampseros (Anacampseros). *fl.* violet, numerous, but rarely produced, about ¼in. in diameter; cymes dense, terminal, globose, with a few small leaves intermixed; flower-stems erect, terete, reddish. July. *l.* orbicular or obovate, obtuse, apiculate, cordate, auricled at base, with reddish margins. Branches erect, rooting at the nodes. Central Europe, 1596. Plant glaucous, evergreen. (B. M. 118.)

Sedum—*continued.*

S. anglicum (English).* *fl.* pure white or rosy-tinted, ⅜in. across; sepals less than half the length of the lanceolate petals; cymes dichotomous, few-flowered; flower-stems 2in. long. July. *l.* crowded, alternate, sub-opposite, less crowded on the flower-stems, erect or spreading, ¼in. to ½in. long. Barren shoots trailing or erect, 1in. to 2in. long, forming dense, cushion-like masses. Western Europe (Britain). A neat and pretty, glabrous, evergreen species, suitable for rockeries. It is rather difficult to cultivate. (Sy. En. B. 531.)

S. anopetalum (erect-petaled). *fl.* pale greenish-yellow, ½in. across; sepals five to seven, deltoid, grooved; petals erecto-patent, somewhat folded and keeled; cymes dense, flat or concave, umbellate, about 1in. in diameter. July and August. *l.* in eight ranks, approximate, sessile, spreading (or on the flowering shoots ascending), ⅜in. long, terete, awl-shaped, spine-tipped, greyish-green, red at the tips. Branches prostrate or ascending, 4in. to 6in. long. South Europe, 1818. Plant more or less glaucous, evergreen.

S. arboreum (tree-like). *fl.* white, ½in. across, five-parted; petals lanceolate, keeled, twice or more longer than the linear-oblong sepals; cymes terminal, many-flowered. July. *l.* on older shoots deltoid, subulate, terete, or somewhat four-sided, ¼in. long, horizontally spreading; those on the young shoots more or less crowded, linear, terete, pimpled. *h.* 4in. to 6in. Native place unknown. Plant glabrous, suffrutescent, evergreen, with no separate barren shoots, branching from near the base, the branches spreading.

S. asiaticum (Asiatic). *fl.* greenish-yellow, in compact, terminal, globose cymes, numerous, five-parted; petals twice the length of the sepals; anthers orange-brown. Summer. *l.* opposite, decussate, spreading, sessile, ⅜in. to 1in. by ⅛in. or more, linear-oblong, coarsely and irregularly toothed. Stems annual, 6in. to 12in. high, erect, unbranched, slender, glabrous. Himalayas. Half-hardy or greenhouse.

S. Beyrichianum (Beyrich's). *fl.* white, ¼in. across; sepals as long as the petals; cyme forked; fertile stems erect, 2½in. high, with numerous crowded, ascending leaves. *l.* in rosettes, ¼in. by ⅛in., spathulate, obtuse, tapering to stalks, red-dotted. Native place unknown. Evergreen.

S. brevifolium (short-leaved).* *fl.* ¼in. across; sepals whitish, with a pink midrib, oblong-lanceolate; petals also having a pink midrib, oblong, acute; cyme umbellate, two or three-forked, with a pedicellate flower in the centre of each fork. July. *l.* crowded, in four rows, 1/10in. long, ovoid, pinkish, densely mealy-pubescent. France, &c. A beautiful little, densely tufted, glaucous, pruinose, evergreen species, with much the habit of *S. dasyphyllum.*

S. carneum variegatum (flesh-coloured, variegated). A form of *S. sarmentosum.*

S. cœruleum (blue).* *fl.* pale blue, five to seven-parted, ½in. in diameter; sepals half the length of the petals, both oblong, obtuse; cyme loose, many-flowered, 1in. in diameter, with recurved branches. July. *l.* tufted, ¼in. long, oblong, obtuse, pale green, spotted with red. Stems 2in. to 3in. high, branched from the base. Mediterranean region, 1822. Plant glabrous or the inflorescence pilose. A charming little annual.

S. collinum (hill-loving). A garden synonym *S. reflexum.*

S. corsicanum (Corsican). A corruption of *corsicum*, a name which has been applied to forms of *S. dasyphyllum* and *S. maximum.*

S. corsicum (Corsican), of Duby. A synonym of *S. dasyphyllum glanduliferum.*

S. dasyphyllum (thick-leaved). *fl.* pinkish, ⅜in. across; petals lanceolate, three or four times the length of the fleshy sepals; cymes corymbose, loose, few-flowered. July. *l.* crowded, sessile, spreading, thick, ⅛in. to ¼in. long, oblong, acute, or sub-orbicular, pimpled. Stems tufted, slender, 2in. to 3in. long, branching. Europe (Britain). Plant glaucous, glabrous, or glandular, evergreen. (Sy. En. B. 530.) The form *glanduliferum* (B. M. 6027), often met with in cultivation, is densely glandular-pubescent (SYN. *S. corsicum*, of Duby); while *oblongifolium* has oblong leaves.

S. dentatum (toothed). A garden synonym of *S. stoloniferum.*

S. denticulatum (slightly-toothed). A garden synonym of *S. stoloniferum.*

S. elegans (elegant). A synonym of *S. pruinatum.*

S. erythrostictum (blush-tinted).* *fl.* greenish, nearly ½in. across; petals spreading, lanceolate, flushed with pink, twice the length of the sepals; cymes terminal, corymbose. September. *l.* opposite or alternate, ascending, 2½in. by 1in., concave, oblong, sinuate, obscurely toothed, entire and sub-cuneate or rounded at base, tapering into short petioles or quite sessile. Stem erect, greenish, 1ft. to 1½ft. high. Japan. A handsome species. (Ref. B. 33 and R. G. 709, under name of *S. albo-roseum.*) The form *variegatum* has leaves blotched with yellow.

S. Ewersii (Ewers').* *fl.* pink or pale violet, numerous; petals twice the length of the sepals, dark-spotted; cymes dense, globose. August and September. *l.* opposite, sessile, about ½in. in diameter, sub-orbicular, cordate-amplexicaul, entire or slightly sinuate. Stock thick, giving off many trailing or ascending, slender branches. Siberia, &c., 1829. A rather tender evergreen, well worth pot culture.

Sedum—*continued.*

S. farinosum (mealy). *fl.* white, crowded, five to seven-parted; sepals pink-tipped, linear-oblong, obtuse; petals lanceolate, acute, keeled; cyme two or three-parted. July. *l.* crowded in four to six rows, deciduous, ½in. by ¼in., scarcely forming a rosette, oblong, obtuse. Stems tufted, cylindrical, much-branched. Madeira. Plant glabrous, glaucous, pruinose or mealy, rather tender, evergreen. Probably an outlying insular form of *S. album.*

S. farinosum (mealy), of gardens. A synonym of *S. album.*

S. glandulosum (glandular).* *fl.* pale reddish-purple, ⅜in. in diameter, usually alternate on short, recurved, simple or forked, terminal cymes; petals twice or thrice as long as the calyx. June. *l.* scattered, sessile, ⅛in. to ⅜in. long, linear-oblong, obtuse, cylindric. Stems simple or forked, 2in. to 6in. long, sub-erect, decumbent or ascending. Spain, 1871. Whole plant glandular-hairy. Annual. (B. M. 5924.)

S. glaucum (glaucous).* *fl.* pinkish-white, ¼in. across, six-parted; sepals deltoid, acute; petals oblong, sharp-pointed at apex; stamens twelve; cymes three to seven-branched, umbellate, the branches spreading, slightly pilose; flower-stems 3in. to 4in. long, reddish. July. *l.* densely crowded, about ⅛in. long, linear, greenish-grey, becoming reddish, studded with fine hyaline pimples at the tips. Barren shoots 2in. long, branched. Central and Southern Europe. A very pretty, glaucous, evergreen species, much used for carpet bedding and other purposes. The form *polypetalum* has seven to nine petals.

S. Hildebrandi (Hildebrand's). *fl.* bright yellow, ⅜in. across; sepals lanceolate; petals lanceolate, acute; cyme branches ¼in. long. July. *l.* ⅛in. long, densely packed, linear, turgid, subulate, erecto-patent, longer and narrower than in *S. acre.* Hungary. Plant glaucous, evergreen.

S. hybridum (hybrid). *fl.* yellow, numerous; sepals linear, obtuse, half as long as the apiculate petals; cymes terminal, much-branched, inversely pyramidal, 2in. to 3in. in diameter; peduncles horizontal or deflexed, with large, spreading bracts. Summer. *l.* alternate, stalked, about 1in. by 1½in., spathulate, coarsely toothed in the upper half, entire and tapering in the lower part, the teeth red-tipped. Stems creeping, glabrous or glandular-hairy. Siberia, 1776. Evergreen.

S. ibericum (Iberian). A garden form of *S. stoloniferum.*

S. japonicum (Japanese).* *fl.* yellow, ½in. in diameter; sepals oblong; petals lanceolate, acute, twice the length of the sepals; cymes loose, terminal and lateral, panicled, many-flowered. Summer. *l.* scattered or opposite, sub-reflexed, spreading, spathulate, oblong, acute, entire, convex below, channelled above, bright green. Stems diffuse. Japan, 1866. Evergreen. (R. G. 513, f. 3, 4.)

S. kamtschaticum (Kamtschatkan).* *fl.* yellow, numerous, ⅜in. across; sepals deltoid, less than half as long as the spreading, apiculate, keeled petals; cymes terminal, umbellate, inversely pyramidal, 1in. to 3in. in diameter; peduncles radiating, with large bracts at base; flower-stems erect, 4in. to 6in. high. Late autumn. *l.* alternate or opposite, 1¼in. by ½in., oblong-obovate, deep green, toothed above the middle, gradually tapering to the petioles; edges minutely papillose. Branches 6in. to 8in. long, greenish or purplish. Stems prostrate. Kamtschatka, 1829. Evergreen SYN. *S. Selskyanum* (of gardens).

S. Liebmannianum (Liebmann's). *fl.* whitish-pink, small, sessile; cymes terminal, three to five-flowered. Summer. *l.* sessile, clustered, fleshy, shining, spreading, conical, one to two lines long, scarcely acute. Branches red, ascending. *h.* 3in. to 4in. Mexico, 1880. Greenhouse perennial.

S. lividum (livid). A garden synonym of *S. lydium.*

S. lydium (Lydian).* *fl.* pinkish, 1/10in. across; petals twice as long as the sepals; cyme corymbose, many-flowered; flowering shoots 4in. to 5in. long. Late summer. *l.* crowded, ¼in. long, linear, sub-terete, greenish or red-tipped, auricled at base, tipped with numerous very minute pimples. Barren shoots 2in. to 3in. high, erect, purplish. Asia Minor, 1867. A charming little, glabrous evergreen for rockwork edgings or carpet bedding. SYN. *S. lividum* (of gardens).

S. Maximowiczii (Maximowicz's). *fl.*, yellow, numerous, in a dense, flat, spreading cyme; sepals unequal, protracted into a long, slender point; petals half as long again as the sepals. Late summer. *l.* sub-opposite or alternate, sub-sessile, 1in. to 1½in. long, oblong-ovate or oblong-lanceolate, sometimes obtuse, regularly toothed, the midrib channelled; upper ones longer and narrower. Stems erect, about 1ft. high, terete or somewhat four-sided, greenish. Japan, Amur.

S. maximum (largest).* *fl.*, sepals deltoid-lanceolate, half the length of the lanceolate, whitish petals, whose tips are spotted with red; cymes terminal and lateral, on long stalks, forming a loose panicle, sub-globose, many-flowered, the lowest stalks usually longest. August and September. *l.* opposite, sessile, spreading, stem-clasping, 2¾in. long, ovate, acute, more or less cordate, crenate-toothed. Stems 1ft. to 2ft. high, erect, green or purple. Europe and Asia. The following varieties are enumerated by Dr. Masters:

S. m. assurgens (increasing). *fl.* pinkish; cymes corymbose; inflorescence loose. *l.* ascending, opposite, green, oblong, obtuse, sinuate. Stem weak, ascending, green.

Sedum—*continued.*

S. m. cordifolium (cordate-leaved). *fl.* whitish, with red spots, ¼in. across; petals concave; inflorescence corymbose. *l.* alternate and opposite, spreading horizontally, oblong-ovate, sinuate-toothed. Stems purplish. (Ref. B. 34, under name of *S. cordifolium.*)

S. m. corsicum (Corsican). *fl.* pale yellow, with a pleasant, apple-like fragrance; inflorescence corymbose. *l.* alternate and opposite, spreading, oblong-ovate, toothed, green. Stems purplish.

S. m. hæmatodes (bloody).* *fl.* whitish, the petals tipped with red; cymes numerous, long-stalked, forming a large, loose, inversely pyramidal panicle, with a few scattered leaves. September. *l.* opposite, 5in. by 3in., oblong-ovate, obtuse, subcordate, coarsely-toothed, purplish. Stems deep purple, erect, 2ft. to 2½ft. high, glabrous. Portugal. A really noble plant, of robust habit.

S. m. pachyphyllum (thick-leaved). *fl.* greenish-yellow; cymes globose, long-stalked, forming a loose, terminal panicle. *l.* opposite, spreading, cordate-ovate, serrulated. Stems reddish.

S. m. præruptorum (overhanging). *fl.* greenish; cymes globose, on long stalks. *l.* recurved, finely toothed. Stems green.

S. m. recurvum (recurved). *fl.* greenish-yellow; cymes in a loose, terminal panicle. *l.* opposite, oblong-ovate, irregularly toothed, recurved. Stems green.

S. m. rigidum (rigid). *fl.* greenish; inflorescence loosely corymbose. *l.*, cauline ones opposite, sessile, ovate-oblong, obtuse, slightly and irregularly sinuate-toothed. Stems deep red, 2ft. to 3ft. high.

S. m. Rodigasi (Rodigas'). A form having purplish leaves, variegated with yellow. In cultivation, it is more tender than most of the varieties of *S. maximum.* (F. d. S. 1669.)

S. m. serotinum (late). *fl.* greenish-yellow; inflorescence loosely panicled. *l.* opposite, the upper ones ternate, spreading, ovate-oblong, sinuate-toothed, green. Stems green, weak.

S. m. ternatum (ternate). *fl.* yellowish; inflorescence corymbose. *l.* reddish above, dark green below, in whorls of three. Stems red.

S. m. triphyllum (three-leaved). *fl.* in terminal corymbs. *l.* ternately whorled, oblong, serrated.

S. Middendorffianum (Middendorff's). *fl.* yellow, numerous, in a flat-topped, umbellate cyme; petals spreading, ⅜in. longer than the sepals; primary branches four, with a central flower in the forks. Summer. *l.* alternate, rather fleshy, sessile, 1in. to 2in. long, erecto-patent, oblanceolate, toothed towards the apex, somewhat concave below. Amur, 1880. The variety *minor* is dwarfer in all its parts.

S. monregalense (Monregalensis). *fl.* white, ½in. across, five-parted; sepals pink-spotted, one-third the length of the petals; petals pinkish-brown and pubescent beneath; cyme loose, terminal, many-flowered, panicled, glandular-pubescent. Summer. *l.* on barren shoots crowded, spreading, thick, ½in. to ¾in. long; those on fertile shoots scattered, narrower, often spotted with pink. Barren shoots spreading, erect, or creeping, 1in. to 4in. long, rooting at the nodes. North Italy. A pretty, dwarf, glabrous (except the inflorescence) evergreen.

S. montanum (mountain-loving). A mere catalogue name, under which no plant has been botanically described.

S. multiceps (many-stemmed). *fl.* pale yellow, ½in. across, five-parted; sepals linear-oblong, obtuse, half the length of the oblong-lanceolate, spreading petals; cymes sub-scorpioid, many-branched, two to six-flowered; flower-stems erect, twice the length of the barren ones. Summer. *l.* ¼in. to ½in. long, glaucous or pruinose, pinkish and papillose, linear and oblanceolate, sub-terete, gibbous at base, spreading on the barren, appressed on the fertile, stems. Branches 2in. to 6in. long, flexuous or erect, giving off adventitious roots, and bearing at the ends dense rosettes of leaves. Algeria. Plant sub-shrubby, much-branched, glaucous, evergreen. (G. C. n. s., x. p. 120.)

S. neglectum (neglected), of gardens. A synonym of *S. album.*

S. Nevii (Dr. Nevius'). *fl.* white, numerous, ½in. across; sepals half the length of the lanceolate petals; cymes forked, the branches 1½in. long, recurved, with a few leafy bracts; flowering stems erect, 2in. to 3in. high. July. *l.* on barren shoots crowded in terminal rosettes, each ⅔in. by ⅜in., obovate-spathulate, tapering into a short stalk, auricled at base, pink-dotted; those on the fertile stems appressed, scattered, smaller than the others. Stems prostrate. North America. Evergreen.

S. nicæense (Nice). *fl.* greenish-yellow, ½in. in diameter, five or six-parted; petals boat-shaped, twice the length of the sepals; cymes many-flowered, terminal, umbellate; flowering stems erect, 10in. to 12in. high. Late summer and autumn. *l.* of the barren shoots ½in. to ⅝in. long, less than ⅓in. wide, ascending or spreading; those of the flowering shoots appressed, lanceolate, distinctly auricled. Stems 6in. to 8in. long, at first prostrate, afterwards ascending; rootstock thick, woody. Mediterranean region. Evergreen. (A. F. P. iii. 90.)

S. obtusatum (obtuse). *fl.* yellow, ¼in. across, shortly pedicellate; petals lanceolate, more than double the length of the oblong, acute sepals; cymes terminal, spreading, umbellate, 1½in. to 2in. in diameter; flower-stems erect, terete, reddish, ultimately leafless, but scarred. June and July. *l.* rosulate,

Sedum—*continued.*

1in. by ⅜in., spathulate, entire, glaucous, becoming reddish-green. Stems prostrate, glaucous, pruinose. California. Evergreen.

FIG. 465. SEDUM OPPOSITIFOLIUM.

S. oppositifolium (opposite-leaved). *fl.* whitish, resembling those of *S. stoloniferum*; fertile stems 6in. high, erect. August. *l.* opposite, decussate, 1½in. by 1½in., sub-orbicular or rhomboid, tapering to short-channelled stalks, bright green, crenate-ciliate at the edges; younger ones crowded at the ends of the branches. Stems rough with minute asperities. Caucasus. Trailing evergreen. See Fig. 465. (B. M. 1807.)

S. populifolium (Poplar-leaved). *fl.* whitish or pinkish, numerous, nearly ½in. across, with the fragrance of Hawthorn; petals three times longer than the sepals; cymes terminal, much-branched, corymbose. August. *l.* alternate, 1½in. by 1in., stalked, ovate, acute, sub-cordate, coarsely and irregularly toothed. Stems erect, 6in. to 10in. high, greenish or purplish, slender, branched. Siberia, 1780. Plant glabrous, suffrutescent, evergreen. Though quite hardy, it forms a charming greenhouse subject.

S. pruinatum (pruinose). *fl.* bright yellow, ½in. in diameter, four to eight-parted; sepals acute, half as long as the obtuse, concave petals; cyme at first recurved, umbellate, many-branched, flat-topped; flower-stems erect, 1ft. high. Late summer. *l.* in many rows, sessile, crowded, spreading, slightly incurved at the ends of the sterile shoots, glaucous-blue, often tipped with rose-pink, about ⅔in. long, linear-oblanceolate, aristate; those of the flowering shoots larger and less crowded. Branches 6in. to 8in. long, trailing, ascending. Europe (Britain). Plant glaucous, pruinose, evergreen. SYN. *S. elegans* (Sy. En. B. 806).

S. p. Forsterianum (Forster's). *l.* on the barren shoots many-ranked, forming terminal rosettes, spreading, pale green, oblanceolate, mucronulate, gibbous at base. Plant glabrous or slightly glaucous. SYN. *S. rupestre Forsterianum.*

S. p. minus (lesser). *l.* oblanceolate, mucronate, in rosettes. Plant glaucous, smaller in all its parts than the type. SYN. *S. rupestre minus.*

S. pulchellum (pretty).* *fl.* rosy-purple, ⅓in. across; petals lanceolate, acuminate, half as long again as the linear-oblong sepals; cyme three or four-branched, with erect flowers crowded in two rows along the upper surface, and each provided with a leafy bract. Branches slender, trailing, or ascending, 3in. to 6in. long. United States, 1874. A very handsome, but little-known, evergreen species. (B. M. 6223; G. C. 1878, 114.)

S. quadrifidum (four-cleft). *fl.* red, in terminal cymes; sepals oblong; petals linear-oblong, twice as long as the sepals. July. *l.* glabrous or puberulous, approximate, sub-terete, ¼in. long. Stem thick, giving off numerous erect, slender stems, 2in. to 5in. high. Arctic Russia, &c., 1809.

S. reflexum (reflexed).* Stone Orpine. *fl.* yellow, ⅓in. across, four to eight-parted; sepals half as long as the linear petals; cymes umbellate, leafy, many-flowered, many-branched, with a flower in each fork; flower-stems erect, 8in. to 10in. high. Summer. *l.* in six or seven rows, crowded on the barren stems into a conical mass, ¼in. to ⅓in. long, linear-subulate, terete, gibbous at base, spreading or abruptly decurved. Stems trailing. Europe (Britain). Plant glabrous, scarcely glaucous, evergreen. SYNS. *S. collinum* and *S. virens* (of gardens). The following varieties are enumerated by Dr. Masters:

S. r. albescens (whitish). *fl.* yellowish-white, ⅓in. across, often six-parted; sepals acute. *l.* rarely in rosettes. Plant glaucous.

S. r. cristatum (crested). This resembles the type; but the stems are fasciated so as to form a crest, as that of the Cockscomb.

S. r. minus (lesser). The smallest variety of all.

S. r. septangulare (seven-angled). *l.* scarcely glaucous, usually somewhat thicker than in *albescens*, and arranged in seven distinct rows, often spirally wound round the stem.

Sedum—*continued.*

S. r. virescens (greenish). This only differs from *albescens* in having pale sulphur-yellow flowers.

S. retusum (retuse-leaved). *fl.* white, with a rosy centre, ¼in. to ⅜in. in diameter, arranged in small, dense, terminal clusters. June. *l.* green, shining, obovate-oblong, retuse, ¼in. to ⅜in. long. Branches grey, mealy when young, leafy only at the tips. Mexico, 1880. Greenhouse.

S. rhodanthum (rose-flowered). *fl.* rose-coloured, numerous, in a dense, terminal cyme 4in. to 5in. long, mostly four-parted; sepals linear; petals lanceolate, acuminate, twice as long as the sepals. End of June. *l.* alternate, lanceolate, entire, channelled, 1in. to 2in. long. Stems tufted, 1ft. to 1½ft. high, erect. Rocky Mountains of Utah and Colorado.

S. Rhodiola (Rhodiola).* *fl.* greenish or reddish-purple, in a terminal, flat-topped, sub-globose cyme, about 1in. in diameter; petals four; pedicels short. Summer. *l.* scattered, glaucous, spreading or erect, 1in. by ¼in., sessile, oblong, obtuse, rounded at base, obscurely one-nerved, slightly toothed at apex. Stems annual, several from the same stock, 6in. to 8in. high, erect, unbranched. Europe (Britain), &c. The roots exhale a perfume of rose-water. (Sy. En. B. 525.) SYN. *Rhodiola rosea. linifolia* (R. G. 1080) is a Turkestan form, with narrow leaves and brightly-coloured flowers. *minor* is a small form.

S. rupestre (rock-loving). *fl.* clear yellow, numerous, barely ¼in. in diameter, five to seven-parted; sepals ovate-oblong, obtuse; petals similar, concave, not keeled; cymes umbellate, three to five-forked, ultimately hollow-topped; stalks 8in. to 12in. long. July. *l.* ¼in. long, in very numerous rows, linear-subulate, incurved, convex below, flattish above, forming dense, obconical rosettes ¾in. to 1in. in diameter, at the ends of the sterile branches. Western Europe (Britain). Plant glaucous, evergreen, but reddening with age and drought.

S. r. Forsterianum (Forster's). A synonym of *S. pruinatum Forsterianum.*

S. r. minus (lesser). A synonym of *S. pruinatum minus.*

S. sarmentosum (sarmentose).* *fl.* bright yellow, numerous, ½in. in diameter; sepals fleshy, half the length of the lanceolate petals; inflorescence a flat-topped, umbellate, three to five-forked cyme, with a solitary flower in the forks. *l.* crowded, opposite, or whorled, ½in. to ¾in. long, linear, terete or slightly flattened, apiculate, slightly gibbous at base; those of the flower-stem scattered, ascending. China. Greenhouse evergreen. There is a variety of this with pink stems, and having leaves marked with a marginal stripe of white or cream-colour; it is grown in greenhouses and for carpet beds under the name of *S. carneum variegatum.*

S. Selskyanum (Selsky's). *fl.* yellow, numerous in a many-branched, hollow-topped, leafy cyme, the rachis flexuous; corolla nearly 1in. across, half as long again as the calyx. Late summer. *l.* sessile, ascending; upper ones 1½in. long, less than ½in. broad, lanceolate from a broad base, ciliated; midrib very prominent on the under surface; margin serrated in its distal third. Stems 1ft. to 1½ft. high, erect, pilose. Amur and Manchuria.

S. Selskyanum (Selsky's), of gardens. A synonym of *S. kamtschaticum.*

S. Semenovii (Semenow's). *fl.* whitish, ½in. or more in diameter, in compact, terminal, globose cymes; sepals reddish, longer than the tube; petals tipped with pink. June. *l.* in six rows, erecto-patent, sessile, about 1in. long, linear, acute, entire, one-nerved, channelled above. Stems annual, from a many-headed rhizome, erect, cylindrical, glabrous, about 1ft. high. Turkestan.

S. sempervivoides (Sempervivum-like).* *fl.* bright red; sepals deltoid, acute, pilose; petals ¼in. long, lanceolate, acute; cyme many-flowered, panicled, 2in. to 4in. in diameter; peduncle pilose. July. *l.* of the rosette forty to fifty, obovate-cuneate, 1in. by ⅜in.; those of the flower-stem clasping, greenish-red, oblong, acute. *h.* 4in. to 8in. Asia Minor. A remarkably handsome, pubescent, annual or biennial species.

S. sexangulare (six-angled). *fl.* yellow, ½in. across; petals lanceolate, double the length of the linear-oblong sepals; cyme three to five-branched, umbellate, 1in. to 3in. across, with scorpioid, one-sided branches; flower-stems erect, 2in. to 3in. high, very slender. July. *l.* densely crowded in six or seven rows, spreading or ascending, about ⅛in. long, linear-cylindric. Barren shoots ascending, 2in. to 3in. long, branched. Europe (Britain). (Sy. En. B. 533.) Plant glabrous, evergreen. A neat-habited species.

S. Sieboldi (Siebold's).* *fl.* pinkish, numerous, ½in. across; petals having a green spot on the back near the top, three times as long as the sepals; cymes much-branched, umbellate; pedicels longer than the flowers. August. *l.* in whorls of three, sessile or nearly so, spreading, sub-orbicular, sinuate, cuneate at base, bluish-green, pinkish on the margins. Branches terete, slender, purplish, erect, afterwards recurved. *h.* 9in. Japan, 1836. Greenhouse or half-hardy evergreen. (B. M. 5358.)

S. S. medio-variegatus (variegated-centred). This differs from the type in having a central blotch of creamy-white on each leaf. (I. H. 373.)

S. spathulifolium (spathulate-leaved). *fl.* yellow, numerous, ½in. across; sepals half the length of the acuminate, keeled petals; cymes terminal, forked, the branches 3in. long. May and June. *l.*, upper ones on the barren shoots about fifteen in a terminal rosette, 1½in. in diameter; lower ones and those of the flower-stem scattered, spreading, ½in. by ⅜in.; those of the flower-stem club-shaped. Branches creeping or ascending, 3in. to 4in. long. North-west America, 1873. Evergreen. (G. C. n. s., v. 146; R. G. 741.)

S. spectabile (remarkable).* *fl.* pink, numerous, ½in. across; sepals whitish; petals twice the length of the sepals, slightly concave; cymes large, flat-topped, inversely pyramidal, leafy, umbellate. September. *l.* opposite, decussate, or in horizontally-spreading whorls of three, 3in. by 2in., flat, scarcely petiolate or the upper ones quite sessile, ovate, obtuse, or spathulate, entire or obscurely toothed, slightly cuneate at base. Stem 1½ft. to 2ft. high. Probably Japan. A robust and noble species. (Ref. B. 32; R. G. 709; I. H. viii. 271, under name of *S. Fabaria.*)

S. spurium (spurious). A synonym of *S. stoloniferum.*

S. stenopetalum (narrow-petaled). *fl.* bright yellow, five-parted; petals linear-lanceolate, acuminate, twice longer than the awl-shaped sepals; cymes much-branched, scorpioid. *l.* numerous, crowded on the barren shoots, sessile, fleshy, lanceolate, ½in. long. Stems 3in. to 6in. long, erect from a decumbent base, simple or somewhat branched. Rocky Mountains, 1877. Plant glabrous, evergreen.

S. stoloniferum (stolon-bearing). *fl.* pink or white, numerous, ⅜in. in diameter; petals nearly twice the length of the sepals; cymes terminal, umbellate, 2in. in diameter; ultimate pedicels shorter than the flowers; flower-stems 6in. long, ascending, reddish. July and August. *l.* opposite, ⅜in. to 1¼in. long, cuneate-spathulate, coarsely toothed above the middle, tapering into short stalks, the margins studded with hyaline papillæ. Barren stems trailing, sometimes brown-dotted, rooting at the nodes. Caucasus. Evergreen. SYNS. *S. dentatum* and *S. denticulatum* (of gardens), *S. spurium* (B. M. 2370). *S. ibericum* (of gardens) is a small, slender form, with white flowers and ciliolate leaves.

S. telephioides (Telephium-like). *fl.* small, numerous; petals falcate, hooded at the tip; cymes small, dense, 1in. to 1½in. in diameter. June. *l.* scattered, 2in. by 1in., oblong-obovate, obtuse, nearly entire or sparingly toothed, cuneate at base. Stem 6in. to 12in. high. North America, 1810. Plant glabrous.

S. Telephium (Telephium). *fl.* pink, white-spotted, or sometimes pure white, numerous, in dense, terminal or lateral, sub-globose, stalked cymes; calyx tube very short, the sepals lanceolate; petals spreading, somewhat recurved; peduncles short and nearly equal. August and September. *l.* scattered, rarely opposite, ascending or spreading, 2in. to 3in. long, 1in. to 1½in. broad, oblong-ovate, obtuse, toothed; lower ones cuneate at base; upper ones somewhat rounded. Stem erect, 1ft. to 1½ft. high. Europe (Britain). *S. T. Fabaria* is a sub-species, having flowers smaller, appearing earlier; petals less recurved; peduncles short, arranged in a terminal cyme. Leaves narrower than in the type, the lower ones slightly stalked. To *S. Telephium* and its sub-species may be referred a large number of more or less constant forms, of which the following are described by Dr. Masters:

S. T. affine (related). *fl.* pink, ⅜in. across; sepals one-third the length of the spreading petals; cymes terminal, loosely fastigiate. August. *l.* alternate, sessile, 2in. by 1in., ovate-oblong, acute, irregularly toothed above. Stem 1ft. to 1½ft. high, greenish or red-spotted.

S. T. arduennense (Ardennes). *fl.* whitish, ⅜in. across; sepals deltoid, one-third the length of the erecto-patent petals; cymes numerous, forming a loose, terminal panicle. August. *l.*, cauline ones alternate, appressed, nearly 4½in. by 2½in., ovate-oblong, obtuse. Stems purplish, 8in. to 12in. high.

S. T. Borderi (Border's). *fl.* pink; cymes corymbose, flat-topped. *l.* distinctly stalked, oblong, obtuse, tapering to the base, irregularly and coarsely toothed. Stems reddish.

S. T. Brunfelsii (Brunfels'). *fl.* pink, ⅜in. across; sepals one-third the length of the spreading, oblong-lanceolate petals; cymes terminal, rounded. August. *l.* glaucous, appressed, sessile, oblong-obovate, 3in. by ½in., irregularly toothed, reddish along the midrib. Stem 6in. to 18in. high.

S. T. Jullianum. *fl.* greenish, ultimately pinkish, ½in. across; sepals one-third the length of the lanceolate petals; cymes terminal and lateral, compact, forming a large, terminal panicle. August. *l.* alternate, appressed, 3in. by 1½in., obovate, irregularly toothed in the upper half. Stems 1ft. to 1½ft. high, finely spotted.

S. T. lugdunensis (Lyons). *fl.* rose-pink; cymes numerous, loosely corymbose, on long stalks. *l.* in whorls of three, spreading or ascending, rounded at base, coarsely toothed. Stems stout.

S. T. occidentale (Western). *fl.* pinkish, ⅜in. across; sepals deltoid-linear; petals spreading, lanceolate; cymes numerous, many-flowered, leafy. August and September. *l.* alternate, ascending, 3in. by 1½in., obovate-oblong, obtuse, tapering to the base, toothed in the upper two-thirds; upper ones sub-cordate. Stems reddish, robust.

S. T. pycnantha (dense-flowered). *fl.* greenish; cymes globose, the lower ones on long stalks; inflorescence compact, many-

Sedum—*continued.*

cymed. *l.* alternate, ascending, tapering at both ends. Stem green.

S. T. rhodanensis (Rhone). *fl.* pink; cymes corymbose, globose, long-stalked. *l.* alternate, spreading, tapering to the base and apex, coarsely toothed.

S. T. rubella (reddish). *fl.* pink; cymes globose, the lower ones on long, horizontal stalks, forming an elongated, oblong panicle. *l.* red, tapering to the base, narrow-oblong, coarsely toothed. Stems red.

S. T. thyrsoideum (thyrsoid). *fl.* greenish or yellowish, ⅛in. in diameter; cymes numerous, globose, many-flowered, on long, ascending stalks, forming a large, compact panicle. August and September. *l.* opposite or whorled; lower ones ascending, 3in. by 1in., oblong, acute, toothed in the upper two-thirds; upper ones smaller, sub-cordate. Stems about 2ft. high, reddish.

The following other forms of *S. Telephium* have been mentioned: *albicans, Bulliardi, Carioni, controversum, corymbiferum, grandidentatum, intermedium,* and *Lobellii.*

S. ternatum (ternate). *fl.* white, ¼in. across, four-parted: sepals oblong, obtuse; petals oblong, acute, twice the length of the sepals; flower-stems erect. July and August. *l.* ½in. long, in whorls of three, sub-orbicular-spathulate, crowded into rosettes at the ends of the barren stems; those of the fertile stems scattered, ascending or spreading, oblong, acute. Barren stems 6in. to 8in. long, prostrate. North America, 1789. A glabrous or glaucous evergreen. (B. M. 1977; B. R. 142.)

S. trifidum (trifid). *fl.* at first reddish, in small, dense, terminal cymes; petals linear-lanceolate, twice the length of the lanceolate sepals. Summer. *l.* glabrous, aggregated towards the top of the stem, sessile, spreading, oblong, cuneate at base, coarsely toothed or pinnatifid. Stems erect, slender, 3in. to 7in. high, unbranched. Temperate Himalayas.

S. umbilicoides (Umbilicus-like). *fl.* white, seven-parted; inflorescence long-stalked, cymose. *l.* rosulate, convex, oblong-lanceolate. Alatan, Turkestan. Evergreen. (R. G. 917.)

SEED. Seeds are met with only in flowering plants, and are the result of the union of the male and female elements, for the reproduction of the species. They are the ovules, fertilised by the action of the pollen, and subsequently ripened (*see* **Ovule**); and each contains an embryo (rarely two or more), *i.e.*, a young plant, capable, when the Seed is placed in suitable conditions, of becoming, in all points, like its parents. The existence of an embryo in Seeds affords a sharp distinction between them and the *spores* of Cryptogams, which correspond with them in function, but are very often one-celled, and never contain an embryo. A reference to the account given under **Ovule** will facilitate the explanation of the changes that the ovules undergo in

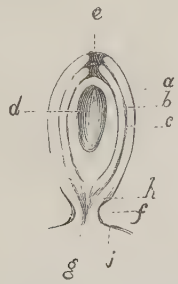


FIG. 466. ORTHOTROPOUS OVULE IN SECTION, showing two Coats (*a, b*), with the Micropyle (*e*), the Nucellus (*c*), and the Embryo-sac (*d*). The signification of the other letters is as follows: *f* is the Funiculus or Stalk; *g*, the Raphe, or Fibro-vascular Bundle in the Stalk; *h*, the Chalaza, where the Stalk afterwards breaks off, and leaves the Hilum or Scar; *i*, the Placenta from which the Ovule grows.

becoming Seeds. In the unfertilised ovule (see Figs. 466 and 467), there are generally two coats, surrounding a central cellular mass called the nucellus; but there is a passage (micropyle) at the true apex of the ovule, through both coats. In the middle of the nucellus lies a large cell, the embryo-sac, formed by the union of two or more cells. Within this sac are several cells (see Fig. 468), *viz.*, at the end next the micropyle two oval or elongated cells, the "helper cells," with a round cell (two in *Santalum album*) at their inner end, called the embryonal

Seed—*continued.*

vesicle. At the opposite end of the embryo-sac are three others, called antipodal cells, which are believed to be the last traces of a prothallus, such as is formed in *Selaginella* among Vascular Cryptogams. Among the protoplasm that lines the walls of the embryo-sac as a thin layer, two nuclei may generally be distinguished. After fertilisation, *i.e.*, after the pollen tube has reached the embryonal vesicle through the micropyle, the helper

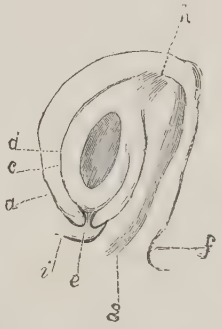


FIG. 467. ANATROPOUS OVULE OF ACTÆA SPICATA, IN SECTION Only one Coat (*a*) exists on it (other lettering as in Fig. 466).

cells and the antipodal cells disappear; the cell wall of the embryonal vesicle becomes thicker, and the cell grows, and becomes divided by cross-walls. At last it forms a cellular mass, the embryo, on the end of the suspensor, which part in most plants is a row, but in some is a mass, of cells. In the embryo of the ripe Seed, it is generally easy to make out radicle, stem, plumule, and one or two cotyledons. Thus, in it all the vegetative

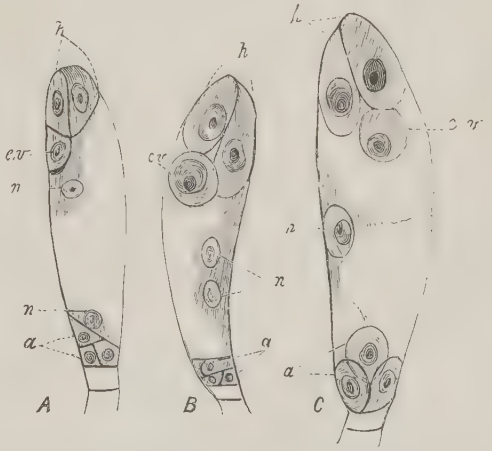


FIG. 468. EMBRYO-SAC OF ANGIOSPERM BEFORE FERTILISATION, IN THREE STAGES, showing (*h*) Helper Cells, (*e v*) Embryonal Vesicle, (*a*) Antipodal Cells, and (*n, n*) Nuclei. In A, the Helper and Antipodal Cells, and the Embryonal Vesicle, are still angular, and the two Nuclei are wide apart; in B, the Embryonal Vesicle is rounded, and the Nuclei lie close together; in C, the Embryonal Vesicle is ready to be fertilised, the two Nuclei are united to form one, and the Antipodal, as well as the Helper Cells are rounded off.

organs of the future plant are represented, except in a few families (*e.g.*, Orchids), in which the embryo is only a mass of cells, without distinction of parts. In *Coniferæ*, the course of development of the ovule into the Seed is different in several respects; but the result is much the same as regards the structure of the mature Seed. While the embryo is in course of development, the nuclei of the embryo-sac give rise to the endosperm. At first, this consists of cells free from one another, but soon

Seed—*continued.*

they come into contact, and, by their union, form a tissue that quite resembles those formed by ordinary cell-divisions, and that does itself increase in size in this way. The endosperm, also called the albumen, is formed in all Seeds; but in many it disappears, as it is used up in the growth of the embryo, *e.g.*, in the Seed of an Apple, or of a Bean. Such Seeds are called "exalbuminous." In many Seeds a considerable, or even a large, albumen exists in the ripe Seed, with the embryo lying in it (*Polygonum*), or around it (*Lychnis*), or at the base (*Carex*), or on one side of it (Grasses). Besides the endosperm, another form of albumen, known as "perisperm," occurs in many plants. This is formed in the tissue of the nucleus, outside the embryo-sac. Perisperm is less common than endosperm, but co-exists with the latter in the ripe Seeds of a few plants (*Nymphæa*), and occasionally replaces it (*Canna*). The albumen may contain starch, oil, cellulose, or other materials for nourishment of the young plant; and its texture varies accordingly. The presence and nature of the albumen afford important characteristics of Natural Orders. Under **Ovule,** it was pointed out that the form of the ovule might remain orthotropous, or might become campylotropous or anatropous. The ripe Seeds show corresponding differences in form.

Seeds generally possess two coats, the outer called "testa," and the inner "tegmen." The latter is usually thin and membranous. The testa is very often thick and hard, *e.g.* in Brazil Nuts. It often bears outgrowths in the form of warts or ridges, hairs (Cotton), or wings, which are sometimes of large size (*Pinus*, *Bignonia*). All these outgrowths bear reference to the modes of distribution of Seeds, fitting them to adhere to the bodies of birds or quadrupeds, or to be distributed by wind. Occasionally, the testa has an outer layer of cells, which become mucilaginous on contact with water, and cause Seeds, when moist, to adhere to the bodies of animals. On the outer surface of the testa is the hilum, or scar, indicating the point of attachment of the Seed to its stalk. Many Seeds possess what resembles a third coat when ripe. In some, this coat, the "arillus," grows up from the placenta around the Seed; in others, it grows from the micropyle downwards, and it is then distinguished as the "arillode." An outgrowth is often seen in anatropous ovules (*e.g.*, in Violets) over the funiculus (the adherent stalk); it is called a "caruncle." This third coat, whether arillus, arillode, or caruncle, in some Seeds is fleshy (*e.g.*, mace of Nutmeg), serving as an inducement to animals to swallow the Seeds, and thus to secure wide distribution in their excrements; in others, it forms a tuft of hairs, and serves as a float for the Seed. In size and form, Seeds vary greatly in different plants, from the minute, dust-like Seeds of Orchids to the large Seed of the Cocoanut. The number produced by different plants is also very variable; but into these and similiar matters it is not possible to enter here.

SEED-BEDS. A term applied to narrow strips of land prepared for the raising of seedling plants that are intended for transplanting into their permanent quarters, instead of being sown and allowed to grow there from the first. In all cases it is advisable to select a position for Seed-beds where the soil is friable and in good working order, and to render the surface smooth and fine before scattering the seeds over it. It is an easy matter to mark off any requisite width, according to the quantity of seed to be sown.

SEED-SOWING. *See* **Propagation.**

SEEMANNIA (named after Berthold Seemann, 1825-1871, a botanist and traveller). ORD. *Gesneraceæ*. A monotypic genus. The species is a strigose-pubescent, stove, perennial herb, with a creeping rhizome, closely allied to *Achimenes* and *Isoloma*. For culture, *see* **Gesnera.**

Seemannia—*continued.*

S. Benaryi (Benary's). A synonym of *S. silvatica.*

S. silvatica (sylvan). *fl.* of a bright scarlet, on solitary, axillary pedicels; calyx with an adnate tube and five narrow lobes; corolla tube shortly gibbous at base, the limb of very short, erecto-patent lobes; stamens affixed to the base of the corolla. Winter. *l.* three or four in a whorl, very shortly petiolate, often canescent beneath; upper ones gradually reduced to bracts. *h.* 3ft. to 4ft. Peru. SYNS. *S. Benaryi* (R. G. 814), *S. ternifolia* (R. G. 126).

S. ternifolia (ternate-leaved). A synonym of *S. silvatica.*

SEGMENT. One of the divisions into which a leaf or other flat organ may be cut.

SEGO. A common name for *Calochortus Nuttallii.*

SEGREGATE. Separated. The reverse of Aggregate.

SELAGINEÆ. A natural order of shrubs, undershrubs, or annual or perennial herbs, inhabiting extra-tropical regions, Australia excepted. Flowers white, blue, or rarely yellow, rather small, hermaphrodite, irregular, bracteate, ebracteolate, in dense, globose, oblong, or elongated, terminal or very rarely axillary spikes; calyx five-cleft or five-parted, or, owing to some of the parts being connate or deficient, three-parted, two-parted, or spathaceous; corolla gamopetalous, shortly or slenderly tubular at base; limb four or five-lobed, one or two-lipped, or sub-regular, spreading; stamens four, didynamous, or two. Fruit small, indehiscent. Leaves alternate, or the lower ones rarely opposite or radical, entire or toothed. The order comprises eight genera and about 140 species. Examples: *Globularia*, *Hebenstretia*, *Selago.*

SELAGINELLA (diminutive of *Selago*, the old name for another Lycopod). ORD. *Lycopodiaceæ*. A vast genus (upwards of 300 species) of stove, greenhouse, or hardy, evergreen plants, much resembling Mosses. "The genus is concentrated in the tropical zone, and has its head-quarters in tropical America. Only two species extend their range into Europe; and the Selaginellas of the Cape, temperate Australia, and South temperate America, are neither numerous nor remarkable. . . . . Habit entirely of *Lycopodium*, from which it differs by its dimorphic spores and sporangia, some of the species, small and fugacious, resembling *Hepaticæ*, with not more than two vascular bundles on the main stems. Stems copiously branched, the ultimate branching usually flabellate-dichotomous, trailing, sub-erect, sarmentose, or scandent, with the root-fibres confined to the base, or in the trailing species extended to the upper nodes; in shape more or less distinctly quadrangular, the faces angled (stems goniotropous, Spring) or the faces flat (stems pleurotropous, Spring); nodes sometimes distinctly articulated. Leaves small, furnished only with a single central vein, usually tetrastichous and dimorphous, and more or less oblique, the two rows of the lower plane larger and more spreading, the two rows of the upper ascending, adpressed to the stem and imbricated; in the sub-genus *Euselaginella* multifarious, or, if tetrastichous, all alike. Spikes usually tetrastichous and often sharply square, but in two sub-genera dimorphic on the same plan as the leaves, but mostly resupinate (*i.e.*, the small bracts on the same plane as the large leaves, and *vice versâ*)" (J. G. Baker, to whose admirable monograph of *Selaginella*, in the "Journal of Botany," 1883-5, we are indebted for the appended descriptions of the species best known to cultivation in this country). Selaginellas grow freely in any light soil, which should be kept open by intermixing charcoal, or small potsherds, through it. They require to be kept quite moist at all times, and prefer shade. Propagated readily from cuttings, made from the creeping stems, which emit roots at nearly every joint. *S. Kraussiana* is the well-known Lycopod so useful for edgings to greenhouse beds, and for decorative purposes in pots. This may be propagated in quantity at any season. Cuttings for preserving a collection of the

Selaginella—*continued.*

species should be inserted, about February or March, in the pots or pans in which they are to remain for the season. Both stove and greenhouse Selaginellas succeed under somewhat similar conditions respectively to stove and greenhouse Ferns.

S. affinis (related). *stems* 1ft. or more long, trailing, flat on the back, bisulcate on the face, jointed at the nodes, forked low down and copiously pinnate, with erecto-patent, copiously compound branches. *l.* of the lower plane obtuse on the branchlets, ascending, oblong-lanceolate, acute, ⅛in. to ¼in. long, bright green; leaves of the upper plane one-third as long, oblique-oblong, cuspidate, imbricated. *spikes* ¼in. to ½in. long; bracts ovate, cuspidate, strongly keeled. Guiana. A rare, stove species. SYN. *S. rigida* (of gardens).

S. africana (African). A synonym of *S. Vogelii.*

S. albo-nitens (shining-white).* *stems* slender, trailing, copiously pinnate, the upper branches simple, the lower slightly compound. *l.* of the lower plane spaced on the main stem, spreading, oblong-lanceolate, one line long, bright green, rather unequal-sided, rounded on the upper side at the base, shortly ciliated; leaves of the upper plane one-third as long, oblique-ovate, distinctly cuspidate. *spikes* ¼in. to ½in. long; bracts acute, very crowded, strongly keeled. West Indies. Greenhouse.

S. amœna (pleasing). A variety of *S. caulescens.*

S. apoda (footless). A garden name for *S. apus.*

S. apus (footless).* *stems* slender, trailing, densely matted, 1in. to 4in. long, the short, distant, erecto-patent branches simple or forked. *l.* of the lower plane spaced below the tips of the branches, the upper spreading, the lower reflexed, ovate, acute, half a line long, unequal-sided; leaves of the upper plane half as long, shortly cuspidate. *spikes* ¼in. to ½in. long; bracts ovate, acute, about one line long, strongly serrulated. Canada, &c. Greenhouse. SYNS. *S. apoda* and *S. densa* (of gardens).

S. argentea (silvery), of Spring. A variety of *S. caulescens.* The name *argentea* is also used in trade catalogues for *S. erythropus.*

S. ascendens (ascending). A form of *S. Martensii.*

S. atroviridis (dark green).* *stems* sub-erect, 6in. to 12in. long, flat on the back, the root-fibres confined to the lower part, decompound, the branching between pinnatifid and pinnate. *l.* of the lower plane close, both on the stem and branches, spreading or rather ascending, oblong-rhomboid, sub-obtuse, ⅛in. to ¼in. long, bright green, unequal-sided, obscurely or distinctly ciliated; leaves of the upper plane half as long, oblong, long-cuspidate, much imbricated. *spikes* square, ½in. to 1in. long; bracts ovate, acute, strongly keeled. Madras, &c. Stove.

S. azorica (Azores). *stems* trailing, rooting nearly to the tip, 2in. to 3in. long, with several short, compound branches. *l.* of the lower plane contiguous on the branches, oblique-oblong, nearly equilateral, acute, ⅛in. long, rounded at the base, serrulated from base to apex along both branches, bright green; leaves of the upper plane much imbricated, more than half as long as the others, oblique, oblong-lanceolate. Azores. Greenhouse.

S. bellula (rather pretty), of Moore. A synonym of *S. inæqualifolia perelegans.*

S. brasiliensis (Brazilian). *stems* trailing, 2in. to 4in. long, copiously pinnate, the branches erecto-patent, the upper simple, the lower slightly decompound. *l.* of the lower plane spaced and spreading, except towards the tips of the branches, nearly or quite one line long, bright green, cordate at base on the upper side, distinctly ciliated and imbricated over the stem; leaves of the upper plane half as long, distinctly cuspidate. *spikes* ¼in. to ½in. long; bracts ovate-lanceolate, strongly keeled. Brazil. Greenhouse. A near ally of *S. apus.*

S. Braunii (Braun's). *stems* 1ft. to 1½ft. long, erect, pale straw-colour, simple in the lower half, decompound, deltoid, and flexuous in the upper half; pinnæ erecto-patent, deltoid; pinnules regular, short, deltoid, spaced; ultimate branchlets ⅛in. to ¼in. long. *l.* of the lower plane contiguous only on the final branchlets, nearly spreading, ovate-rhomboid, half a line long; leaves of the upper plane one-third to half as long, shortly cuspidate. *spikes* short, square; bracts little longer than the sporangia. West China. A distinctly-marked and well-known, greenhouse species.

S. Brownii (Brown's). A form of *S. Kraussiana.*

S. cæsia (grey). A garden synonym of *S. uncinata.*

S. c. arborea (tree-like). A synonym of *S. Willdenovii.*

S. canaliculata (channelled).* *stems* sub-erect, sarmentose, 3ft. to 4ft. long; pinnæ deltoid, usually 4in. to 6in. long, sometimes flexuous and more elongated; lower branchlets copiously compound, the tertiary divisions more erecto-patent, and not so close as in *S. inæqualifolia. l.* of the lower plane crowded, oblong-rhomboid, 1/12in. to ⅛in. long on the branchlets, bright green, cuneate-truncate on the upper, nearly square on the lower, side at the base; leaves of the upper plane half as long, ovate-lanceolate. *spikes* square, ¼in. to 1in. long; bracts cuspidate, strongly keeled. Eastern Himalayas, &c. Stove. Rare in cultivation. SYNS. *S. caudata, S. chinensis, S. sinensis* (of gardens).

Selaginella—*continued.*

S. c. robusta (robust). A very tall, strong-growing garden form SYN. *S. robusta* (of gardens).

S. caudata (tailed). A synonym of *S. canaliculata.*

S. caulescens (stemmed).* *stems* generally 6in. to 12in. long, stiffly erect, unbranched in the lower half, with spaced, adpressed leaves, deltoid and decompound in the upper half; pinnæ close, deltoid, with copiously sub-flabellately compound lower pinnules, the final branchlets ascending. *l.* of the lower plane crowded, ovate, falcate, acute, half a line to one line long, bright green, slightly ciliated on the upper side at base; leaves of the upper plane a quarter to one-third as long, much imbricated. *spikes* square, ¼in. to ½in. long; bracts ovate, cuspidate. Japan, China, &c. Stove.

S. c. amœna (pleasing). *stems* erect, about 1ft. high; upper part triangular, pinnately branched, with spreading, distant, acuminate leaves; branches horizontal, bipinnate. Mexico. Whole plant of a bright and cheerful green.

S. c. argentea (silvery). This only differs from the type in the silvery sheen of its under surface. SYN. *S. argentea* (of gardens).

S. c. japonica (Japanese). *stems*, pinnæ less crowded, and not so decompound as in the type. *l.* of the lower plane broadly ovate; those of the main stem and pinnæ nearly as broad as long; those of the unbranched part of the stem rather spreading. Japan.

S. chinensis (Chinese). A garden name for *S. canaliculata.*

S. cognata (related). A synonym of *S. Lobbii.*

S. conferta (clustered). *stems* very slender, trailing, intermatted, 1in. to 2in. long, copiously pinnate, the lower branches slightly compound. *l.* of the lower plane close, erecto-patent, linear-oblong, obtuse, half a line long, equal-sided, strongly ciliated, a little imbricated; leaves of the upper plane one-third or one-fourth as long, acute. *spikes* very short; bracts ovate, crowded, strongly keeled. Cuba. Stove.

S. convoluta (convolute). *stems* densely tufted, 3in. to 6in. long, compound nearly to the base, the primary branching pinnate, the short, broad, erecto-patent pinnæ between pinnate and flabellate. *l.* of the lower plane much imbricated, ascending, ovate, acute, half a line long, serrulated, bright green; leaves of the upper plane half as long, acute. *spikes* square, ¼in. to ½in. long; bracts cuspidate, strongly keeled. Tropical America. Stove.

S. cuspidata (cuspidate).* *stems* densely tufted, about 6in. long, branched nearly or quite from the base, the primary branching pinnate; pinnæ short, rhomboid, copiously compound, with contiguous branchlets. *l.* of the lower plane crowded, ascending, oblique-ovate, cuspidate, dilated and ciliated on the upper side at base, pale green, white-edged, half a line to one line long; leaves of the upper plane nearly as long, cuspidate. *spikes* square, ¼in. to ½in. long; bracts cuspidate, strongly keeled. Mexico, &c. A common, stove species.

S. c. elongata (elongated). *stems* 1ft. or more long, simple in the lower part, the primary branches more elongated and more pinnate. SYN. *Lycopodium cordifolium* (of gardens).

S. delicatissima (very delicate). *stems* densely matted, very slender, stramineous, trailing to a length of 6in. to 12in., forked and copiously pinnately branched, the branches copiously compound. *l.* of the lower plane spaced, except at the tips of the branches, spreading, oblong, obtuse, broadly rounded and densely ciliated on the upper side at base; leaves of the upper plane half as long, acute, strongly auricled on the outside at base. *spikes* unknown. Probably Andine. Greenhouse. The leaves and branches curl up readily in drought.

S. densa (dense). A garden name for *S. apus.*

S. denticulata (small-toothed).* *stems* densely matted, pale, trailing, 6in. long, copiously pinnately branched, the lower branches copiously flabellately compound. *l.* of the lower plane close or slightly spaced, broadly ovate, oblique, sub-acute, three-quarters of a line to one line long, spreading or erecto-patent, flat, denticulate, cordate on the upper side at base, much imbricated over the stem; leaves of the upper plane half as long, cuspidate, rather diverging. *spikes* sessile, square, about ¼in. long; bracts acute, much imbricated, strongly keeled. Mediterranean region. Greenhouse. In exposed places, the whole plant sometimes turns bright red when old.

S. dichrous (two-coloured). A garden form of *S. Vogelii.*

S. distorta (distorted). *stems* slender, trailing or sub-erect, intermatted, 3in. to 6in. long, obscurely jointed at the nodes, copiously pinnate, the short, ascending branches sub-flabellately compound. *l.* of the lower plane crowded on the branchlets, deflexed, oblong-lanceolate, acute, about half a line long; leaves of the upper plane more than half as long, imbricated, oblong, acute. *spikes* short, square; bracts acute, strongly keeled. Brazil. Greenhouse.

S. d. major (larger). More luxuriant, with stouter stems, 1ft. or more in length, and often excurrent at the end; leaves of the lower plane often one line long, spreading, or rather ascending.

S. divaricata (divaricate). A form of *S. Martensii.*

Selaginella—*continued.*

S. erythropus (red-footed).* *stems* about 9in. long, bright crimson, simple in the lower half or third, deltoid and decompound upwards; lower pinnæ deltoid, tripinnate; final branchlets ascending, contiguous. *l.* of the lower plane contiguous, ascending, oblong or ovate-lanceolate, acute, $\frac{1}{16}$in. to $\frac{1}{8}$in. long, bright green, unequal-sided, strongly ciliated and imbricated over the stem on the upper side at the base; leaves of the upper plane half as long, oblique-ovate, cuspidate. *spikes* square; bracts cuspidate, strongly keeled. Tropical America. Stove. The form *major* is more compound, the unbranched part of the stem longer, and all its leaves adpressed. *S. setosa* (of gardens) is a starved, small form of this species.

S. filicina (Fern-like). A synonym of *S. hæmatodes.*

S. flabellata (fan-shaped). *stems* 1ft. to 2ft. long, erect, simple in the lower half, deltoid and decompound in the upper half; pinnæ deltoid, the lower three or four-pinnate; final branchlets contiguous, $\frac{1}{4}$in. to 1in. long. *l.* of the lower plane contiguous, oblique-ovate, acute, ascending, bright green, obliquely inserted, much dilated, ciliated, much imbricated over the stem on the upper side at base; leaves of the upper plane a quarter to one-third as long, cuspidate. *spikes* square, $\frac{1}{2}$in. to 1in. long; bracts cuspidate, strongly keeled. Tropics of Asia, America, and Polynesia. Stove.

S. flagellata (whip-like). *stems* trailing, 6in. long; branches erecto-patent, the lower ones copiously compound; branches excurrent and whip-like at the end. *l.* of the lower plane ovate-lanceolate, very acute, above one line long, pellucid, bright green, more produced on the upper side of the midrib, rounded at the base, shortly ciliated, imbricated over the stem; leaves of the upper plane one-third as long, ovate, acuminate, falcate, converging. *spikes* $\frac{1}{4}$in. to $\frac{1}{2}$in. long; bracts very acuminate, strongly keeled. French Guiana. Stove.

S. flagellifera (whip-bearing). A garden form of *S. plumosa.*

Selaginella—*continued.*

S. flagelliformis (whip-like). A synonym of *S. plumosa flagellifera.*

S. flexuosa (flexuous). *stems* about 1ft. long, flat on the back, copiously branched, the lower branches elongated and copiously compound, the upper part assurgent; root-fibres often only developed from the lower half. *l.* of the lower plane close, spreading, bright green, oblong-rhomboidal, sub-acute, $\frac{1}{8}$in. to $\frac{1}{4}$in. long, more produced on the upper side of the distinct midrib, serrulated on the upper side near the base; leaves of the upper plane one-third as long, long-cuspidate. *spikes* $\frac{1}{4}$in. to 1in. long, square; bracts half a line long, crowded, sharply keeled. South Brazil. Stove.

S. formosa (beautiful). A form of *S. Martensii.*

S. fulcrata (fulcrate). *stems* 1½ft. to 2ft. long, stiffly erect, simple in the lower half, with a few distant, small, adpressed leaves, deltoid and decompound in the upper half; pinnæ deltoid, the lower ones three or four-pinnate, the rachises pubescent; final branchlets contiguous, $\frac{1}{4}$in. to $\frac{1}{2}$in. long. *l.* of the lower plane rather spaced even on the branchlets, ascending, lanceolate, acute, $\frac{1}{16}$in. to $\frac{1}{8}$in. long, truncate; leaves of the upper plane half as long, incurved, not cuspidate. *spikes* square, $\frac{1}{4}$in. to $\frac{1}{2}$in. long; bracts little longer than the sporangia. Eastern Himalayas. A well-marked, greenhouse species.

S. Galeottéi (Galeotté's). *stems* 1ft. to 2ft. long, sub-erect, with root-fibres from the lower half, sometimes excurrent and whip-like at the tip, copiously pinnate, the branches pyramidal and decompound. *l.* of the lower plane close on the branchlets, spaced on the branches and stem, ascending, lanceolate or oblong-lanceolate, acute, $\frac{1}{16}$in. to $\frac{1}{8}$in. long, more produced on the upper side of the midrib, broadly rounded and shortly ciliated on the upper side at the base, truncate and auricled on the lower; leaves of the upper plane one-third to one-half as long, much imbricated. *spikes* $\frac{1}{4}$in. to $\frac{1}{2}$in. long; bracts cuspidate, strongly keeled. Mexico. Stove.

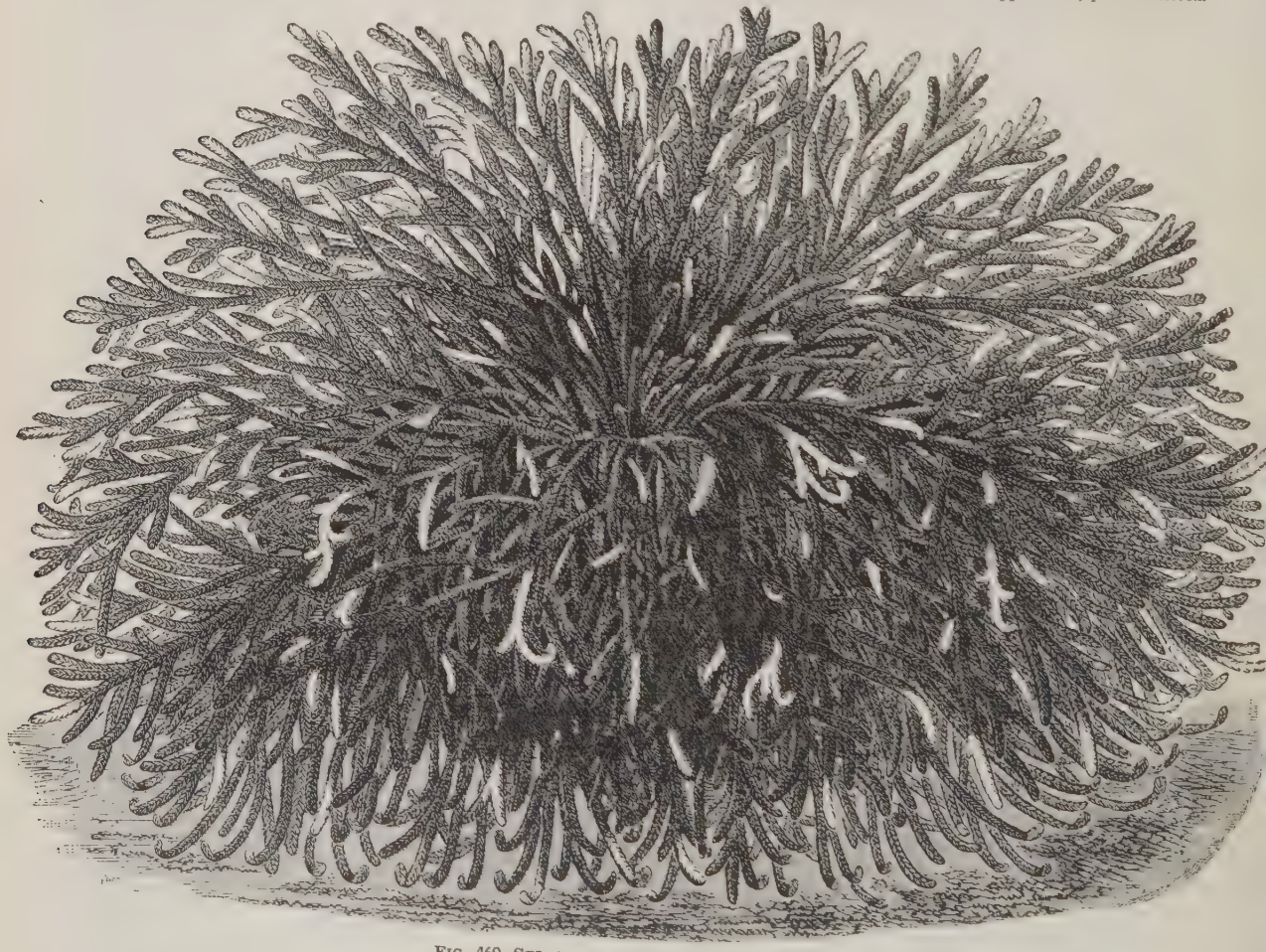


FIG. 469. SELAGINELLA INVOLVENS VARIEGATA.

Selaginella—*continued.*

S. grandis (great).* *stems* erect, 1½ft. to 2ft. long, simple in the lower half, deltoid and decompound in the upper half, the branching midway between flabellate and pinnate, the contiguous final branchlets ⅜in. broad. *l.* of the lower plane crowded, lanceolate, very acute, ⅛in. to ¼in. long, bright green, equilateral except at the base, slightly ciliated; leaves of the upper plane one-third as long, ovate-lanceolate, very acute, much imbricated. *spikes* copious, square, tetragonal, 1in. to 1½in. long; bracts strongly ciliated. Borneo, 1882. A very fine, stove plant. (G. C. n. s., xviii. p. 40.) SYN. *S. platyphylla* (of gardens).

S. hæmatodes (bloody).* *stems* 1ft. to 2ft. long, bright crimson, unbranched in the lower half, with leaves much spaced and adpressed, deltoid and decompound in the upper half; pinnæ deltoid, three or four-pinnate, the contiguous, erecto-patent ultimate divisions ⅛in. to 1in. long. *l.* of the lower plane contiguous, ascending, ovate or oblong-rhomboidal, acute, ⅛in. to ⅛in. long, bright green, dilated on the upper side at the base, broadly rounded; leaves of the upper plane minute, with a large cusp. *spikes* square, 1in. to 1½in. long; bracts ovate-lanceolate. Andes. Stove. One of the handsomest species. SYN. *S. filicina.*

S. helvetica (Swiss). *stems* densely matted, slender, pale, trailing, 2in. to 3in. long, forked at base, distantly pinnately branched, with short, erecto-patent, slightly compound branches. *l.* of the lower plane spreading, close or slightly spaced, half a line or more long, oblique, produced on the upper side; leaves of the upper plane acute, half as long, rather divergent. *spikes* distinctly pedunculate, ⅛in. to 1in. long, terete; bracts imbricated. Central Europe to Japan. Hardy. (J. F. A. 196, under name of *Lycopodium helveticum.*)

S. inæqualifolia (unequal-leaved). *stems* sub-erect, sarmentose, 3ft. to 4ft. long; pinnæ oblong-lanceolate, 6in. long, the erecto-patent branchlets considerably compound, with ascending tertiary divisions. *l.* of the lower plane contiguous, oblong-rhomboid, ⅓in. to ⅛in. long, bright green; leaves of the upper plane half as long, shortly cuspidate. *spikes* square, ⅛in. to ⅛in. long; bracts ovate, cuspidate, strongly keeled. Eastern Himalayas. A well-known, stove species.

S. i. perelegans (very elegant). *stems* not more than 1ft. long; pinnæ shorter, more deltoid, with more compound lower branches. *spikes* copious, often 1in. long. SYN. *S. bellula* (of Moore) (G. C. n. s., xi. p. 173).

S. involvens (rolled up). *stems* very densely tufted, 2in. to 6in. long, deltoid, twice or thrice pinnate, branched nearly or quite from the base, the branching of all grades between flabellate and pinnate. *l.* of the lower plane very crowded, ascending, ovate, with a distinct cusp, about one line long, bright green, very thick, serrulated, nearly equal-sided; leaves of the upper plane nearly as long, oblique, distinctly cuspidate. *spikes* square; bracts acutely keeled. Japan, China, &c. Greenhouse. (G. C. n. s., xix. p. 404.)

S. i. texta (woven). A peculiar garden form, in which the branches are almost simple. SYN. *S. texta* (of Belgian gardens).

S. i. variegata (variegated). This only differs from the type in having the tips of some of the branches creamy-white. See Fig. 469, for which we are indebted to Mr. Wm. Bull.

S. japonica (Japanese). A variety of *S. caulescens.*

S. Karsteniana (Karsten's). *stems* about 1ft. long, erect from a decumbent base, bisulcate down the face, copiously pinnate; branches short, erecto-patent, sparingly compound. *l.* of the lower plane ovate, acute, dark green, sub-diaphanous, very unequal-sided, denticulate on the upper margin, much produced on the upper side at base and imbricated over the stem; leaves of the upper plane one-third as long, ovate-oblong, cuspidate. *spikes* short, often twin, but little flattened; bracts not very obviously dimorphous. New Grenada. Greenhouse.

S. Kraussiana (Krauss').* *stems* trailing, 6in. to 12in. long, jointed at the nodes, copiously pinnate, with copiously compound, erecto-patent branches. *l.* of the lower plane contiguous on the branchlets, spaced on the branches and main stems, oblong-lanceolate, acute, ⅛in. to ¼in. long, bright green, ciliated and broadly rounded at base; leaves of the upper plane one-third as long, not cuspidate. *spikes* short, square; bracts cuspidate, strongly keeled. South Africa, 1878. Greenhouse. *S. Brownii* is a dwarf form from the Azores. The form *aurea* has yellow leaves; *variegata* is a variegated form.

S. lævigata (smooth).* *stems* erect, 1ft. to 1½ft. long, simple in the lower half, the leaves small, distant and soon deciduous, deltoid in the upper half, with petiolate, deltoid, once or twice pinnate pinnæ; final divisions erecto-patent, 2in. to 3in. long. *l.* of the lower plane crowded, oblong-lanceolate, sub-patent, very falcate, acute, ⅛in. to ⅛in. long, bright green, adnate by a broad base, decurrent on the lower side; leaves of the upper plane minute, recurved. *spikes* square, ⅛in. to 1in. long; bracts acute, strongly keeled. Madagascar. Stove.

S. l. Lyalli (Lyall's). *stems*, lower pinnæ bipinnate, with final divisions ⅛in. to 1in. long. A more compound variety.

S. lepidophylla (scaly-leaved).* The Resurrection Club-moss, which is frequently exposed for sale as a vegetable curiosity, owing to the manner in which its curled-up stems unroll and resume a fresh appearance when placed in water. *stems* densely tufted, 2in. to 4in. long, branched to the base, the primary branching closely pinnate, the broad, cuneate, ascending

Selaginella—*continued.*

pinnæ copiously sub-flabellately compound. *l.* of the lower plane much imbricated, ascending, oblique, ovate, obtuse, half a line long, minutely ciliated, when old tinted red-brown; leaves of the upper plane nearly as long, obtuse. *spikes* square, ⅛in. to ⅛in. long; bracts deltoid, acutely keeled. Texas to Peru. Greenhouse. (G. C. 1872, p. 69.)

S. Lobbii (Lobb's). *stems* sub-erect, sarmentose, 3ft. to 4ft. long; pinnæ regular, lanceolate-deltoid, about 6in. long, cuneate at base; pinnules contiguous, erecto-patent, the upper ones simple, the lower forked. *l.* of the lower plane contiguous, oblong-lanceolate, falcate, acute, ⅛in. long on the pinnules, ⅛in. to ⅛in. on the pinnæ, bright green, truncate and rather dilated on both sides at base; leaves of the upper plane one-third as long, cuspidate. *spikes* square, oblique-ovate, terminal on the branchlets, ⅛in. to ⅜in. long; bracts cuspidate, strongly keeled. Borneo. Stove. Rare in cultivation. SYN. *S. cognata.*

S. ludoviciana (Louisianian). *stems* slender, copiously pinnate, flat, 6in. long, the upper branches simple, the lower slightly compound. *l.* of the lower plane much spaced below the tips of the branches, spreading, ovate-oblong, sub-acute, half a line or more long, serrulated, imbricated over the stem; leaves of the upper plane half as long, cuspidate. *spikes* ⅛in. to ⅛in. long; bracts one line long, strongly keeled. United States. A well-known, greenhouse species, allied to *S. apus.*

S. Lyalli (Lyall's). A form of *S. lævigata.*

S. Martensii (Martens').* *stems* 6in. to 12in. long, trailing in the lower half, with copious, long root-fibres, ascending in the upper half, decompound, the branching between pinnate and flabellate. *l.* of the lower plane usually crowded, erecto-patent, oblong-lanceolate, sub-obtuse, bright green, unequal-sided, serrulated, a little imbricated; leaves of the upper plane half as long, with a long cusp, much imbricated. *spikes* ⅛in. to ⅛in. long, square; bracts acute, strongly keeled. Mexico. A common, greenhouse species, with numerous varieties, of which the most distinct are: *ascendens, divaricata, formosa,* the variegated *robusta,* and *stolonifera.*

S. molliceps (soft-stemmed). *stems* erect, densely tufted, 6in. to 9in. long, copiously pinnate, the base bisulcate; lower branches copiously compound. *l.* of the lower plane contiguous on the branchlets, spaced on the main stem, erecto-patent, obliquely oblong-lanceolate, acute, dark green, one line long, very unequal-sided, serrulated on the upper edge, broadly rounded, shortly ciliated, and a little imbricated over the stem on the upper side at base; leaves of the upper plane one-half to one-third as long, ovate or ovate-lanceolate, cuspidate. *spikes* copious, re-supinate, ⅛in. to ⅛in. long; bracts of the upper plane lanceolate-rhomboid, those of the lower plane ovate, cuspidate. Upper Guinea. Stove. SYN. *S. rubricaulis.*

S. mutabilis (changeable). A synonym of *S. serpens.*

S. patula (spreading). *stems* slender, pale, trailing, 6in. to 9in. long, with a long, whip-like tip, and numerous short, alternate, pinnately-arranged branches with three to seven branchlets. *l.* of the lower plane crowded, erecto-patent, oblong-lanceolate, bright green, the midrib distinct, ciliated and imbricated over the rachis on the upper side at the base; leaves of the upper plane one-third as long, oblique-ovate, acute. *spikes* square, ⅛in. to ⅛in. long; bracts cuspidate, much imbricated, strongly keeled. Jamaica. A common, greenhouse species.

S. pilifera (hair-bearing). *stems* densely tufted, 3in. to 4in. long, copiously compound, cuneate, the branching midway between pinnate and flabellate, the branches erecto-patent. *l.* of the lower plane crowded on the branches, rather spaced on the main stem, ascending, oblique-ovate, half a line long, distinctly cuspidate. *spikes* square, ⅛in. to ⅛in. long; bracts strongly keeled. Texas. Greenhouse. A rare species in cultivation.

S. platyphylla (flat-leaved). A garden synonym of *S. grandis.*

S. plumosa (feathery). *stems* pale, trailing, 6in. to 12in. long, often forked low down, copiously pinnately branched, the branches copiously compound, the root-fibres extending to the upper nodes. *l.* of the lower plane contiguous on the branches, spreading or rather ascending, bright green, oblong- or ovate-lanceolate, acute, ⅓in. to ⅛in. long, ciliated at base, cordate on the upper side and much imbricated over the stem; leaves of the upper plane one-third as long, ovate, cuspidate, much imbricated. *spikes* copious, square, ⅛in. to ⅛in. long; bracts acute, strongly keeled. Eastern Himalayas. Stove. *S. flagellifera* is merely a garden form of this species. SYN. *S. flagelliformis.*

S. Pœppigiana (Pœppig's). *stems* trailing, 1ft. to 2ft. long, forked at base, jointed at the nodes, copiously pinnate, with copiously compound, erecto-patent branchlets. *l.* of the lower plane spaced, except towards the tips of the branchlets, much spaced on the main stem, ascending, oblong-lanceolate, ⅛in. to ⅛in. long, broadly rounded on the upper side at base; leaves of the upper plane one-third as long, oblique, with a distinct cusp. *spikes* square, ⅛in. to ⅛in. long; bracts acute, sharply keeled. Andes. Greenhouse.

S. Poulteri (Poulter's).* *stems* densely tufted, very slender, sub-erect, 2in. to 3in. long, three or four times trichotomously-forked, with slender radicles from the lower half. *l.* of the lower plane distinctly spaced, spreading, sub-orbicular, obtuse, half a line long, bright green; leaves of the upper plane nearly as long, but acute, ascending. *spikes* slender, ⅛in. to 1in. long; bracts scarcely longer than the sporangia. Azores, 1868. Greenhouse.

Selaginella—*continued.*

S. rigida (rigid). A garden name for *S. affinis.*

S. robusta (robust). A garden name for *S. canaliculata robusta.*

S. rubella (reddish). *stems* 1ft. long, sub-erect, with root-fibres from the lower half, reddish-brown, pinnately branched, the lower branches cuneate, with five to seven branchlets. *l.* of the lower plane ascending, crowded on the branchlets, oblique-oblong, obtuse or obscurely cuspidate, $\frac{1}{12}$in. to $\frac{1}{8}$in. long, dark green, turning reddish with age, more produced and ciliated on the upper side at the base; leaves of the upper plane half as long, ovate, cuspidate, much imbricated. *spikes* square, $\frac{1}{2}$in. to 1in. long; bracts long-cuspidate, strongly keeled. Native country unknown, 1870. Greenhouse. (G. C. 1871, p. 902.)

S. rubricaulis (red-stemmed). A synonym of *S. molliceps.*

S. selaginoides (Fir Club-moss-like). A synonym of *S. spinosa.*

S. serpens (winding). *stems* densely matted, quite trailing, 6in. to 9in. long, copiously pinnate, branched, with numerous, erecto-patent, slightly compound branches. *l.* of the lower plane crowded, spreading, three-quarters of a line long, ovate-oblong, bright green with a distinct midrib, both sides rounded and ciliated at base; leaves of the upper plane one-third as long, acute. *spikes* square, $\frac{1}{4}$in. to $\frac{1}{2}$in. long; bracts cuspidate, crowded, strongly keeled. West Indies. A well-known, stove species. SYNS. *S. mutabilis, S. variabilis, S. varians.*

S. setosa (bristly). A garden form of *S. erythropus.*

S. sinensis (Chinese). A garden synonym of *S. canaliculata.*

S. spinosa (spiny). *barren stems* short, trailing, slender, little branched, with short, ascending branches. *l.* lax and spreading on the lower part of the barren branches, dense and ascending upwards, lanceolate, half a line to one line long, acute, bright green, ciliated. *fertile stems* erect, simple, 2in. to 3in. long, with a leafy peduncle about as long as the spike. *spike* multifarious; bracts lax, ascending, lanceolate or ovate-lanceolate, $\frac{1}{8}$in. to $\frac{1}{6}$in. long, strongly ciliated, not acutely keeled. Europe (Britain), North America. Hardy. SYN. *S. selaginoides.*

S. spinulosa (small-spined). *stems* very slender, trailing, 1in. to 2in. long, little-branched. *l.* of the lower plane spaced even on the branchlets, oblong, obtuse, half a line long, pale green, strongly ciliated; leaves of the upper plane a quarter to one-third as long, oblong, acute. *spikes* short, square; bracts cuspidate, strongly keeled. Java. Stove.

S. stolonifera (stolon-bearing). A form of *S. Martensii.*

S. suberosa (slightly ero·e). *stems* densely tufted, sub-erect, often above 1ft. long, pale, shining brown, copiously pinnate, the branching erecto-patent and decompound, the root-fibres sometimes extending half-way up to it. *l.* of the lower plane spaced and erecto-patent on the branches, very distant and spreading on the main stem, oblique-lanceolate or ovate-lanceolate, acute, bright green, unequal-sided, much produced, broadly rounded, shortly ciliated; leaves of the upper plane half as long, long-cuspidate. *spikes* copious, $\frac{1}{4}$in. to $\frac{2}{3}$in. long, resupinate; bracts of the upper plane lanceolate, erecto-patent, of the lower plane ascending, ovate, cuspidate. Khasia Mountains. Greenhouse.

S. sulcata (furrowed). *stems* trailing in the lower half, usually assurgent in the upper half, deeply bisulcate down the face, jointed at the nodes, copiously flabellate-pinnate, the final branchlets contiguous. *l.* of the lower plane close on the branchlets, spaced on the stem, oblong-lanceolate, acute, $\frac{1}{8}$in. to $\frac{1}{6}$in. long, auricled on both sides at base; leaves of the upper plane one-third as long, long-cuspidate. *spikes* $\frac{1}{2}$in. to $\frac{1}{2}$in. long, square; bracts acute, strongly keeled. South Brazil. Greenhouse.

S. texta. *See* **S. involvens texta.**

S. uncinata (hooked).* *stems* weak, slender, pale straw-coloured, bisulcate on the face, trailing, 1ft. to 2ft. long, with a long, excurrent tip, and alternate, short, pinnately arranged, copiously compound branches. *l.* of the lower plane sub-ovate, $\frac{1}{12}$in. to $\frac{1}{8}$in. long, close or rather spaced on the branches, thin, bright blue-green, minutely petiolate, both sides cordate at base; leaves of the upper plane one-third as long, cuspidate, much imbricated. *spikes* $\frac{1}{4}$in. to $\frac{1}{2}$in. long, square; bracts one line long, crowded, sharply keeled. China. A well-known, greenhouse species. This is the proper name of the blue-tinted plant known in gardens as *S. cæsia.*

S. variabilis (variable). A synonym of *S. serpens.*

S. varians (variable). A synonym of *S. serpens.*

S. Victoriæ (Victoria's). *stems* sub-erect, sarmentose, 3ft. to 4ft. long; pinnæ lanceolate-deltoid, 6in. to 9in. long, caudate; upper pinnules erecto-patent and simple, contiguous, the lower forked or slightly pinnate. *l.* of the lower plane crowded, oblong-lanceolate, falcate, acute, one line long, dark bright green, obscurely petiolate; leaves of the upper plane a quarter as long, much imbricated. *spikes* square, 1in. to 2in. long; bracts acutely keeled. Borneo, &c., 1879. Stove. Rare in cultivation. (G. C. n. s., xi. p. 75.)

S. viticulosa (tendrilled). *stems* about 9in. long, stramineous, simple in the lower part, deltoid and decompound upwards; pinnæ deltoid, bi- or tripinnate, the root-fibres sometimes extending to the axils of the lowest pinnæ, the contiguous, ascending final segments $\frac{1}{2}$in. to 1in. long. *l.* of the lower plane contiguous, ascending, lanceolate or oblique-ovate, acute, $\frac{1}{12}$in. to $\frac{1}{8}$in. long, bright green; leaves of the upper plane one-third as long, oblique-ovate, cuspidate. *spikes* square; bracts cuspidate, strongly keeled. Central America and Venezuela. Stove.

Selaginella—*continued.*

S. Vogelii (Vogel's). *stems* 1ft. to 2ft. long, erect, simple in the lower half, often pink-tinted, with a few distant, small, adpressed leaves, deltoid and decompound in the upper half; lower pinnæ deltoid, petiolate, three or four-pinnate, the contiguous, erecto-patent final divisions $\frac{1}{4}$in. to $\frac{2}{3}$in. long. *l.* of the lower plane spaced even on the branchlets, lanceolate or oblong-lanceolate, ascending, acute, one to two lines long, bright green, both edges liable to be revolute, truncate at base; leaves of the upper plane minute, with a large cusp. *spikes* square, $\frac{1}{2}$in. to $\frac{1}{2}$in. long; bracts cuspidate, strongly keeled. West Africa. Stove. Well known in cultivation. SYN. *S. africana.* There is a variegated form. *S. dichrous* is a garden form of this species.

S. Wallichii (Wallich's).* *stems* sarmentose, sub-erect, 2ft. to 3ft. long; pinnæ lanceolate, 6in. to 9in. long; pinnules invariably simple, crowded, erecto-patent, 1in. to 1$\frac{1}{2}$in. long, the end one sometimes 3in. to 4in. long. *l.* of the lower plane crowded, oblong-lanceolate, slightly falcate, pointed at the upper corner, equal-sided, the lower ones of the pinnules $\frac{1}{12}$in. to $\frac{1}{6}$in. long, the upper gradually smaller, dark bright green, obscurely petiolulate, truncate or slightly cordate on both sides at the base; leaves of the upper plane a quarter as long, much imbricated. *spikes* square, terminal on the pinnules, $\frac{1}{2}$in. to 1in. long; bracts cuspidate, strongly keeled. India. A common and ornamental, stove species.

S. Willdenovii (Willdenow's).* *stems* climbing to a length of 12ft. to 20ft. or more; pinnæ spreading, deltoid, 1ft. to 2ft. long, pinnules deltoid and decompound; ultimate branches short and contiguous. *l.* of the lower plane crowded, ascending, ovate or oblong, $\frac{1}{12}$in. to $\frac{1}{8}$in. long, green with a tint of blue, obscurely petiolate, cordate on both sides at base; leaves of the upper plane one-third as long, not cuspidate. *spikes* square, $\frac{1}{2}$in. to 1in. long; bracts scarcely larger than the sporangia. Cochin China, &c. A well-known, stove species. SYN. *S. cæsia arborea.*

SELAGO (the old Latin name, used by Pliny, for a plant which the Druids gathered with mysterious ceremonies). ORD. *Selagineæ.* A genus comprising nearly eighty species of greenhouse shrubs or under-shrubs, often Heath-like, rarely dwarf, annual herbs; one is a native of Madagascar, another is found in tropical Africa, and the rest are extra-tropical South African. Flowers in the axils of the ovate or narrow bracts, or rarely shortly pedicellate with a bract, in terminal spikes; calyx two, three, or five-cleft; corolla limb oblique or sub-bilabiate; stamens four, didynamous. Leaves narrow or rather small, sometimes very small, alternate, scattered, or the lower ones rarely opposite; often fascicled in the axils, entire or toothed. A selection of species, including those best known in gardens, is given below. They are of easy culture in sandy loam or peat and sand. Propagation may be effected by seeds; or by cuttings of half-ripened wood, inserted in sandy soil, under a bell glass, in bottom heat. All are South African sub-shrubs, flowering in summer.

FIG. 470. FLOWERING BRANCH OF SELAGO DISTANS.

S. corymbosa (corymbose). *fl.* white, corymbose; corolla tube scarcely exceeding the calyx; bracts ovate-linear. *l.* linear, fascicled. Stem erect, branched, pubescent. *h.* 2ft. 1699.

S. c. polystachya (many-spiked). *fl.* loosely paniculate-spiked or thyrsoid; corolla larger. *l.* acute, flat. *h.* 9in. 1823.

S. distans (distant). *fl.* white; calyx segments acuminate, shorter than the corolla tube; spikes solitary, terminal, scattered-flowered; bracts oblong. *l.* fascicled, two to three lines long, slightly incurved, semi-terete, obtuse. Stems sub-dichotomously branched; branchlets pubescent. *h.* 1ft. 1845. See Fig. 470. (B. R. xxxi. 46.)

S. fasciculata (fascicled). A synonym of *S. serrata.*

S. fruticosa (shrubby). *fl.* yellow, in pedunculate heads, spikes, or panicles; corolla scarcely exceeding the calyx. *l.* linear, slightly obtuse, glabrous, slightly spreading or the lower ones reflexed, solitary or sub-fasciculate, the margins revolute. *h.* 1ft. 1774.

Selago—*continued.*

S. Gillii (Gill's).* *fl.* pink; corolla tubular; spikelets terminal, 1in. to 3in. long, or the panicle shortened and loosely few-flowered. *l.* clustered, whitish, glabrous, elliptic-lanceolate or the lower ones ovate, three to six lines long. Stem branched. *h.* 6in. 1829. (B. M. 3028; B. R. 1504.)

S. rapunculoides (Rampion-like). A synonym of *S. spuria.*

S. rotundifolia (round-leaved). *fl.* purple; corolla tube filiform, three or four times longer than the calyx; spikelets terminal, straight, pedunculate, scarcely 1in. long. *l.* obovate-elliptic, glabrous, entire, clustered-fasciculate. Stem straight, terete. *h.* 1ft. 1814.

S. serrata (toothed). *fl.* blue, disposed in long spikes or fascicled corymbs; corolla tube filiform, elongated; bracts linear-subulate. *l.* obovate-elliptic, acute, serrated, decurrent, often glabrous. Stems straight, leafy. *h.* 1ft. 1774. SYN. *S. fasciculata* (B. R. 184; L. B. C. 1423).

S. spuria (spurious). *fl.* violet; corolla tube filiform, very long; spikes short, terminal. *l.* linear-elongated, acute, toothed, the upper ones shorter and entire. Stem nearly simple, erect. *h.* 2ft. 1824. SYN. *S. rapunculoides.*

SELANDRIA CERASI. A name formerly given in England to the Sawfly now known as *Eriocampa limacina*, the parent of the dreaded Slugworm, frequently so destructive to most kinds of fruit-trees, *e.g.*, Cherry, Pear, and many others, as well as to several forest-trees, *e.g.*, Oak and Birch. *See* **Slugworms.**

SELATIUM. A synonym of *Gentiana.*

SELENIA (probably from *selene*, the moon; connection not obvious). ORD. *Cruciferæ.* A small genus (two species) of small, hardy, annual herbs, natives of Texas and Arkansas. Flowers yellowish, in terminal, leafy racemes; sepals spreading, coloured, sub-equal; petals erect. Leaves pinnatisect. *S. aurea*, whether for the colour or odour of its flowers, or for the considerable time it remains in blossom, is well worthy of cultivation. It requires similar treatment to other hardy annuals.

S. aurea (golden).* *fl.* erect, the lower ones solitary in the upper axils, the upper ones collected into a sub-corymbose raceme; sepals greenish-yellow; petals golden-yellow, twice as long as the sepals, obovate-spathulate. June. *l.* 1in. to 2in. long, ⅛in. to ¼in. broad, linear-oblong, pinnatifid; segments about five to seven pairs. *h.* 9in. 1881. (B. M. 6607.)

SELENIPEDIUM (from *selenis*, a little crescent, and *pedion* or *podion*, a slipper; in allusion to the crescentic, slipper-shaped labellum). South American Lady's Slipper. Including *Uropedium.* ORD. *Orchideæ.* A genus comprising about a dozen species of stove, terrestrial Orchids, differing from *Cypripedium* in having a three-celled and three-furrowed or three-lobed ovary; they inhabit the mountainous parts of South America, Flowers showy or rarely mediocre, pedicellate; sepals spreading; petals free; lip sessile, spreading, inflated like a slipper; peduncles many-flowered. Stem erect, leafy. Regarding *S. Schlimii*, Mr. B. S. Williams remarks (in the "Orchid Grower's Manual"): "This is a difficult plant to cultivate. The imported plants appear as if they had been growing beside streams of water which are subjected to being flooded, for the leaves are frequently coated to a great extent with deposited mud; and it would, therefore, appear that our difficulties with this plant have arisen chiefly from an insufficient supply of water. We pot in peat, adding a little turfy loam and sand, with good drainage, and take care that water does not lodge in the heart of the plant. It is best grown at the cool end of the Cattleya house." For general culture, *see* **Cypripedium** (under which the species were formerly included).

S. Ainsworthii (Ainsworth's).* *fl.*, upper sepal whitish or yellowish-green, bordered with pale purple, the lower one very wide, ventricose; petals rather broad, purple, with a green mid-vein and a pallid area near the base; side laciniæ of lip reflexed, pale sulphur-yellow, copiously spotted inside at base; staminode sulphur-colour, with a dark purple, hairy border outside. 1878. A hybrid between *S. Sedeni* and *S. Roezlii.*

S. albo-purpureum (white-and-purple). *fl.* much larger than in *S. Sedeni*; dorsal sepal having a pinkish tinge on the margin, elongated-ovate; petals pinkish, 5in. to 6in. long, twisted, hanging down beyond the lip; pouch of the lip dull crimson-red, the inflected edges at its base ivory-white, bordered with pink, and nearly covered by rosy spots. *l.* long, green, linear-lorate. A handsome garden hybrid between *S. Dominianum* and *S. Schlimii.* SYN. *Cypripedium albo-purpureum* (Gn. xxi. 332).

Selenipedium—*continued.*

S. calurum (beautiful-tailed).* *fl.* large and showy, freely produced; dorsal sepal pale green, longitudinally ribbed with purple; petals pale green, edged with rose-red near the base, wholly bright rose-red at apex, 2½in. long, narrower and more twisted than in *S. Sedeni*; lip of a deep wine-crimson outside, very handsome. *l.* elongated, channelled, acute, green, in a thick tuft. Stems tall, branched, brownish-red. A handsome, free-flowering hybrid between *S. longifolium* and *S. Sedeni.* SYN. *Cypripedium calurum* (F. & P. 1884, 145; W. O. A. iii. 136).

FIG. 471. INFLORESCENCE OF SELENIPEDIUM DOMINIANUM.

S. cardinale (cardinal). *fl.*, dorsal sepal blush-white, faintly striped with green; petals blush-white, with a patch of crimson-purple hairs towards the base; lip similar to that of *S. Schlimii*, but about 1in. in diameter. December. A beautiful hybrid between *S. Sedeni* and *S. Schlimii albiflorum.*

S. caricinum (Carex-like).* *fl.* pale green, the sepals and petals having a white margin, and the ends being blotched with brown; petals narrow, deflexed and twisted; lip black-dotted on the inner margin, oblong; staminode bordered with black hairs; spike rising clear of the leaves, four to seven-flowered. *l.* stiff, narrow, channelled. *h.* 1ft. or more. Peru. Plant having a Sedge-like appearance. SYNS. *S. Pearcei* (F. d. S. 1648), *Cypripedium caricinum* (B. M. 5466).

S. caudatum (tailed).* *fl.*, sepals and petals yellowish, marked with brown; petals tail-like, often reaching 2½ft. in length, more deeply coloured towards the base; lip reddish-brown, the basal portion yellow, spotted with reddish-brown; scapes 1ft. to 1¾ft high. April and May. *l.* ensiform, distichous, light green.

Selenipedium—*continued.*

Chiriqui, Peru, 1851. A very remarkable, stemless, evergreen orchid. SYN. *Cypripedium caudatum* (F. d. S. 565; G. C. n. s., iii. p. 211; Gn. iii. 513; L. & P. F. G. i. 9; R. G. 661; R. H. 1857, p. 318, and 1885, p. 472; W. S. O. ii. 1).

S. c. roseum (rose-coloured). *fl.* dark rose, intermixed with the yellow and green. (I. H. 1886, 596.)

S. conchiferum (shell-bearing). *fl.*, dorsal sepal whitish, veined with pale greenish-yellow, oblong-triangular; petals white, veined with green at base, brownish-crimson towards the tips, twisted, ribbon-like; lip pale olive-green, having the inflexed side lobes spotted with brown, and covered at the top with green warts. A hybrid between *S. caricinum* and *S. Roezlii.*

S. Dominianum (Dominy's).* *fl.* yellowish-green, tinged with coppery-brown; lip deep reddish-brown in front, with sharper reticulations, yellowish-green behind, the incurved mouth also yellowish, spotted with dark purple; stems erect, three-flowered. *l.* linear-elongate, broader than in *S. caricinum*, between which and *S. caudatum* this plant is a hybrid. See Fig. 471. SYN. *Cypripedium Dominianum* (F. M. 499; F. & P. 1874, 57; Gn. iii. 491).

S. grande (large).* *fl.* large; dorsal sepal yellowish-white, veined with yellowish-green, elongated, incurved; petals ribbon-like, more than 1ft. long, pendulous, broadest at base, where they are yellowish-white and hairy, the narrow part crimson; lip large and prominent, narrow at base, where the unfolded lobes are whitish, spotted with crimson, the front part greenish-yellow, paler and whitish beneath; staminode yellow, flushed with crimson, fringed on its upper edge with blackish-crimson hairs; scape 3ft. high, many-flowered. *l.* sword-shaped, 2ft. to 2½ft. long. A grand hybrid between *S. caudatum* and *S. Roezlii.*

S. Hincksianum (Hincks'). *fl.*, sepals whitish-green, with nerves of a darker tint; petals light greenish, with a deep greenish middle line and a brown border at base, the tails brown; lip green, marked with some small, brown spots near the base, long and narrow. Darien, 1878. SYN. *Cypripedium Hincksianum.*

S. kaieteurum (Kaieteur Fall). A synonym of *S. Lindleyanum.*

S. Lindeni (Linden's).* *fl.*, sepals white, veined with green, broad, oval-lanceolate, the linear-ligulate petals and lip velvety-white, streaked with green at base, the points lengthened out into purplish-red, tail-like appendages, sometimes 2ft. long; scape branching, velvety, two-flowered, 1ft. or more high. May. *l.* erect, ligulate, obtuse, pale green, 10in. long, forming a distichous tuft. New Grenada, 1850. SYN. *Uropedium Lindeni* (B. H. 1854, 193; F. d. S. vi. 123; R. G. 315; R. H. 1857, p. 511; R. X. O. 15).

S. Lindleyanum (Lindley's). *fl.*, sepals pale green, with reddish-brown nerves on the outside, pubescent, with crisped margins, the upper one hooded at apex; petals pale green, with brownish-crimson veins, 2½in. long, falcately linear, the margins recurved and ciliated; lip light olive-green, with brownish-crimson veins, and densely dotted on the side lobes; scape many-flowered, pubescent. *l.* coriaceous, bright dark green, 7in. to 9in. long, 2in. to 2½in. broad. Kaieteur Fall, British Guiana, 1885. SYN. *S. kaieteurum.*

S. longifolium (long-leavéd). *fl.*, dorsal sepal yellowish-green, streaked with purple, the lower ones large; petals green, with a red marginal band, bordered with white, several inches long; lip green, suffused with shining purplish-brown; spike many-flowered. *l.* distichous, long-ligulate, keeled, dark green. Central America, 1869. SYN. *Cypripedium longifolium* (B. H. 1873, p. 65; B. M. 5970; F. & P. 1871, 126), *C. Reichenbachianum.*

S. l. coloratum (coloured). *fl.* with purplish-veined sepals and purplish petals. *l.* broader. 1873. A fine variety.

S. Pearcei (Pearce's). A synonym of *S. caricinum.*

S. porphyreum (porphyry-coloured). *fl.* nearly purplish, very much like those of *S. Sedeni*, but the open sides of the slipper-like lip are not provided with tumid protuberances, and both petals and the odd sepal are very distinctly shaped, more tapered to the point. *l.* as in *S. Roezlii.* 1878. A hybrid between *S. Roezlii* and *S. Schlimii.*

S. reticulatum (reticulated). *fl.* whitish, reticulately veined with green; dorsal sepal narrow-lanceolate, acute; lower ones broadly elliptic-oblong, very obtusely rounded at apex; petals linear, acute, twisted, horizontally spreading. Ecuador, 1885. A remarkable species.

S. Roezlii (Roezl's).* *fl.* very large; dorsal sepal yellowish-green, suffused with rosy-purple on the borders, the lateral ones flesh-coloured; petals green, with a bright red-purple border and tip, linear-lanceolate, spreading; lip 3in. long, the saccate part greenish-yellow; scape many-flowered, 3ft. high. March to May. *l.* 2ft. long, 2in. broad, bright green, ligulate, keeled. New Grenada, 1873. SYN. *Cypripedium Roezlii* (B. M. 6217; F. M. ser. ii. 119; I. H. ser. iii. 138; R. G. 754).

S. Schlimii (Schlim's).* *fl.* 2in. across; sepals and petals white, mottled and striped with dark rose; lip white, the front of the pouch marked with a large blotch of deep rose; stem hairy, longer than the leaves, branching, eight-flowered. *l.* ligulate, acute, 8in. long, light green. New Grenada, 1867. See Fig. 472. SYN. *Cypripedium Schlimii* (B. M. 5614; F. d. S. 1917; I. H. ser. iii. 183; R. X. O. i. 44).

Selenipedium—*continued.*

S. S. albiflorum (white-flowered). *fl.*, sepals and petals white, dusted with delicate pink at the base; lip white, suffused with rose, more deeply coloured opposite the bright yellow column. Winter. 1875. A robust, free-growing variety. SYN. *Cypripedium Schlimii albiflorum* (I. H. 183.)

FIG. 472. INFLORESCENCE AND LEAF OF SELENIPEDIUM SCHLIMII.

S. Schröderæ (Baroness Schröder's).* *fl.*, dorsal sepal pale reddish-green, lined with greenish-purple; petals whitish-green in the centre, stained with purplish-crimson, 4in. long, very broad, turned downwards; lip dull crimson, resembling that of *S. caudatum.* December. *l.* as in *S. Sedeni.* Stems branching. A very distinct hybrid between *S. caudatum* and *S. Sedeni.* (W. O. A. 196.)

S. Sedeni (Seden's).* *fl.* large and showy; sepals greenish-white, ovate; petals longer, white, edged with purplish-crimson, twisted; lip rich crimson, white and crimson-spotted inside; stem taller than the leaves, bearing several flowers. *l.* ligulate, tapering, about 1ft. long, deep green. A handsome hybrid between *S. longifolium* and *S. Schlimii.* See Fig. 473. SYN. *Cypripedium Sedeni* (F. M. ser. ii. 206, 302; R. G. 1875, p. 150, and 1877, p. 86; R. H. 1879, p. 470).

S. S. candidulum (whitish). *fl.*, sepals and petals white, with a rosy hue on the edge; lip purple. A hybrid between *S. longifolium* and *S. Schlimii albiflorum.*

S. stenophyllum (narrow-leaved). *fl.*, dorsal sepal rosy, very pallid, green-nerved; the lower one the same colour, but nearly white in the centre, shell-like; petals purplish at their ends, much bearded towards the cordate base; lip pale purplish, the mouth of the inflexed lobes greenish-white, and streaked with rows of purple blotches. *l.* lorate, linear-ligulate, acute, very long. 1876. A hybrid between *S. Schlimii* and *S. caricinum.*

S. vittatum (striped). *fl.*, sepals pale green, the upper one only half as broad as the lower, striped with red; petals brownish-red, lined with green towards the base, linear, arcuate-deflexed, undulated; lip brownish, inside green, spotted with reddish-brown, shorter than the lower sepals, and half as long as the petals; scape 1ft. to 1½ft. high, minutely puberulous, few-flowered. *l.* 1ft. long, linear-ligulate, acute, bright green, very distinctly margined with yellow. Brazil, 1876. (I. H. 238.)

S. Wallisii (Wallis'). *fl.*, sepals pale green, striped and slightly spotted with bright green; petals white, veined with green, about 8in. long, passing into very narrow tails, tinted with very pale brown at apex; lip large, white, spotted and veined with crimson, the mouth margined with yellow; stems three to five-flowered. *l.* ligulate, acute. Ecuador. SYN. *Cypripedium Wallisii* (R. X. O. 181).

SELF-HEAL, or **ALL-HEAL**. *See* **Prunella vulgaris**.

SELINUM (from *Selinon*, the Greek name for Parsley; applied to this genus on account of the resemblance in the leaves). SYNS. *Cnidium*, *Mylinum*. Including *Oreocome*. ORD. *Umbelliferæ*. A genus comprising about twenty-five species of mostly hardy, branched, glabrous, perennial herbs; one is found in the mountainous parts of Columbia, and another in South Africa, the rest being all natives of the Northern hemisphere. Flowers white or rarely yellowish-green, in compound, many-rayed umbels. Leaves pinnately decompound. The species possess no interest from a garden standpoint.

SELLIGUEA. Included under **Gymnogramme** (which *see*).

SEMECARPUS (from *semeion*, a mark, and *karpos*, a fruit; the black, acrid juice of the nut is used by the natives for marking cotton cloths). ORD. *Anacardiaceæ*.

Semecarpus—*continued*.

A genus comprising about a score species of stove, evergreen trees, inhabiting tropical Asia, and especially abundant in Ceylon. Flowers small; calyx five-cleft, the segments imbricated, deciduous; petals five, spreading, imbricated; stamens five; panicles terminal or lateral, branched, bracteate. Nuts or drupes reniform. Leaves alternate, simple, coriaceous, on simple petioles. The only species introduced requires culture similar to **Anacardium** (which *see*).

FIG. 473. SELENIPEDIUM SEDENI.

S. Anacardium (Anacardium). Kidney Bean of Malacca. *fl.* greenish-yellow, disposed in a terminal, tomentose panicle. July and August. *l.* oblong, rather blunt, beneath glaucous and more or less covered on the nerves with scabrous down. *h.* 50ft. East Indies (on mountains), 1824. (B. F. S. 166.)

S. A. cuneifolium (cuneate-leaved). *l.* wedge-shaped and acuminate at base, blunt at apex.

SEMEIANDRA (from *semeion*, a mark, signal, and *aner*, *andros*, a male; in allusion to the conspicuous shape of one of the stamens). ORD. *Onagrarieæ*. A genus

Semeiandra—*continued.*

comprising only two species of slender, pubescent, greenhouse, evergreen shrubs, inhabiting the mountains of Mexico. Flowers scarlet, showy, axillary, solitary, pedunculate; calyx coloured, four-lobed, globose at base; petals four, small, linear-subulate; stamens two, one ending in a petal-like expansion, the other with two perfect cells. Leaves usually opposite, petiolate, oblong-lanceolate, serrated, membranous. One of the species has been introduced. It requires culture similar to **Fuchsia** (which *see*).

S. grandiflora (large-flowered). *fl.* large and handsome; calyx tube funnel-shaped, the limb cut into four very long-linear, acuminate segments, of which three are reflexed and the fourth is erect; petals four, linear-subulate. Spring. *l.* ovate or ovate-lanceolate, tapering below, acuminate at the apex, penniveined. *h.* 6ft. Mexico, 1853. (B. M. 4727.)

SEMELE (the name of the mother of Bacchus, after whom the genus was named). SYN. *Amphion.* ORD. *Liliaceæ.* A monotypic genus. The species is an ornamental, greenhouse, evergreen, climbing shrub, thriving in any rich soil. It may be multiplied by division of the roots.

S. androgyna (hermaphrodite). *fl.* small, fascicled, six to twenty in an umbel; perianth greenish-white, with a very short tube and ovate lobes; umbels solitary or few, produced from the sides, or rarely from the face, of the cladodes. April. Cladodes leaf-like, alternate or scattered, solitary at the axils of small, fuscous-membranous scales, ovate or ovate-lanceolate, acuminate, coriaceous, with many slender nerves. Stem branched. Canary Islands, 1713. SYN. *Ruscus androgynus* (B. M. 1898, 3029).

SEMI. This term, used in Latin compounds, signifies half; *e.g.*, Semi-amplexicaul, half-clasping a stem; Semi-hastate, hastate on one side only.

SEMI-LUNAR, SEMI-LUNATE. Resembling a half-moon. The same as Lunate.

SEMINAL. Pertaining to seed.

SEMINIFEROUS. Seed-bearing.

SEMPERVIRENS, SEMPERVIRENT. Evergreen.

SEMPERVIVUM (the old Latin name used by Pliny, and derived from *semper vivo*, to live for ever; alluding to the well-known tenacity of the species). House Leek. Including *Æonium* and *Greenovia.* ORD. *Crassulaceæ.* A genus comprising fifty or more species of greenhouse or hardy, thick, fleshy herbs or sub-shrubs, of variable habit, often stemless, and emitting young plants from the axils, sometimes caulescent and leafy; they inhabit the mountains of Central and Southern Europe, Madeira, the Canary Islands, Asia Minor, Nubia, Abyssinia, and the Western Himalayas. Flowers white, pink, greenish, yellow, or purplish, in paniculate, often dense cymes; calyx cut or parted into six or numerous segments, rarely five-cleft; petals six or numerous, free, or connate at base, and adhering to the filaments, oblong or lanceolate, acute or acuminate; stamens twice as many, or rarely the same number, as the petals, free; filaments filiform. Leaves alternate, thickly fleshy, often revolute. *S. tectorum* is found growing on walls and houses in Britain, but it is not indigenous. Sempervivums succeed in any sandy soil, and may be readily propagated from seeds, or by the young plants which appear round old ones at the base. All the hardy species are admirably adapted for planting on rockwork; and the greenhouse ones, *S. tabulæforme*, for instance, are valuable for succulent and carpet bedding during summer.

Mr. J. G. Baker's admirable classification of the hardy species in cultivation (published in the "Gardeners' Chronicle," n. s., vol. xii.) is appended. By its help, the names of any of the hardy species here described may be readily determined. Mr. Baker says that the following eleven forms "cannot be regarded as more than varieties or sub-species belonging to one variable specific type": *S. arvernense, S. atlanticum, S. Boissieri, S. Boutignyanum, S. calcaratum, S. calcareum,* **Sempervivum**—*continued.*

S. glaucum, S. Lamottei, S. Schottii, S. tectorum, and *S. triste.*

Sub-genus I. Sempervivum proper.

Parts of the flowers usually in twelves. Open flower bell-shaped.

RHODANTHA.—Flowers reddish.

Group 1. *Ciliata.* Leaves of the barren rosette glabrous on the face when mature, shortly ciliated on the edges only.
- Leaves large, green or slightly glaucous, with a conspicuous, red-brown tip: *S. arvernense, S. Boissieri, S. Boutignyanum, S. calcaratum, S. tectorum.*
- Leaves large, green or glaucous; red-brown tip none or very obscure: *S. atlanticum, S. glaucum, S. Lamottei, S. Schottii.*
- Leaves large, purplish-brown throughout: *S. triste.*
- Leaves large, very glaucous, with a distinct red-brown tip: *S. calcareum.*
- Leaves small, green, with a distinct red-brown tip: *S. parvulum.*
- Leaves small, glaucous, with a distinct red-brown tip: *S. Greenii.*
- Leaves small, green; red-brown tip none or very obscure: *S. Funckii, S. Verloti.*

Group 2. *Pubescentia.* Leaves of the barren rosette pubescent on the face, as well as ciliated on the edges, not tipped with a tuft of spreading hairs.
- Flower small; stamens two-thirds as long as the petals: *S. assimile.*
- Flower large; stamens half as long as the petals: *S. anomalum, S. flagelliforme, S. montanum.*

Group 3. *Barbatula.* Leaves of the barren rosette strongly ciliated on the edges, and furnished with a tuft of short, straight hairs at the tip.
- Moderately tall: *S. Fauconneti, S. fimbriatum, S. Pomelii.*
- Dwarf: *S. barbatulum.*

Group 4. *Arachnoidea.* Dwarf species, with the tips of the inner leaves of the rosette connected by fine, fleecy threads, like a spider's web.
- Arachnoid threads many: *S. arachnoideum, S. Mogaridgei.*
- Arachnoid threads few: *S. Doellianum, S. oligotrichum.*

CHRYSANTHA.—Flowers yellow.

Leaves obovate-cuneate, glabrous on the face: *S. Wulfeni.*
Leaves obovate-cuneate, hairy on the face: *S. Braunii, S. grandiflorum, S. ruthenicum.*
Leaves oblanceolate, very hairy on the face: *S. Pittoni.*

Sub-genus II. Diopogon.

Parts of the flower usually in sixes. Flowers always yellowish. Expanded flower spreading widely.
- Flowers small; petals not fimbriated on the edge and keel: *S. Heuffelii, S. Reginæ-Amaliæ.*
- Flowers large; petals fimbriated on the edge and keel.
  - New rosettes rolled up into round balls: *S. arenarium, S. soboliferum.*
  - New rosettes not rolled up into round balls: *S. hirtum.*

The best-known species are described below. Except where otherwise stated, they are hardy perennials.

S. aizoides (Aizoon-like). *fl.* yellow, corymbose; petals five to eight, spreading. May to July. *l.* scattered, obovate, flat, quite entire, glabrous. Stem erect, branched. *h.* 1ft. Madeira. Greenhouse, evergreen shrub.

S. anomalum (anomalous). *fl.* four to eight in a dense head, all sessile or sub-sessile; corolla bright mauve-purple, 1in. in diameter, very hairy on the outside. June. *l.* thirty to forty to a rosette, oblanceolate, cuspidate, green, with pubescent faces, hairy-edged, the outer ones only tinted with red-brown, ⅜in. to ½in. long. Flowering stem 3in. to 4in. long, its leaves hairy all over and tinted with red-brown, the lowest ½in. to ¾in. long. Barren rosettes not exceeding 1in. in diameter. A garden species.

S. arachnoideum (cobwebby).* *fl.* nine to twelve-parted, less than 1in. in diameter; petals bright red, lanceolate; filaments bright purple; panicle dense, few-flowered, clothed with slightly fragrant, glandular hairs. June. *l.* about fifty to a rosette, oblong-cuneate, obscurely cuspidate, minutely glandular-pubescent above, the tips connected by long, soft, white hairs; outer leaves reddish-brown at back, ⅜in. long. Flowering stem 3in. to 4in. long, its leaves furnished at tips with tufts of soft hairs. Barren rosettes ½in. to ¾in. in diameter. Pyrenees and Central Europe, 1699. (B. M. 68; J. F. A. (App.) 42.)

S. a. Laggeri (Lagger's).* A large variety, having fully-developed rosettes 1½in. in diameter. See Fig. 474.

S. arboreum (arborescent). *fl.* golden-yellow, disposed in a loose panicle: petals nine to eleven. March to December. *l.* cuneiform, glabrous, ciliated, spreading, and rosulate at the tops of the branches. Stem arborescent, smooth, branched. *h.* 3ft. to 6ft. Portugal, &c., 1640. Greenhouse, evergreen shrub. (B. R. 99; S. F. G. 473.)

S. a. atropurpureum (dark purple). *l.* blackish-purple. A very effective variety when grown in a sunny position.

Sempervivum—*continued.*

S. a. variegatum (variegated). *l.* green, margined with creamy-white.

S. arenarium (sand-loving).* *fl.* six-parted, many in a dense head, 2in. to 3in. in diameter; petals pale yellow, ¼in. to ⅜in. long, distinctly tricuspidate. Summer. *l.* sixty to eighty to a rosette, oblanceolate, acute, not cuspidate, minutely ciliated on the edges; outer ones a little tinted with red-brown, ½in. to ⅔in. long. Flowering stem 6in. to 9in. long, finely pubescent, the crowded leaves strongly ciliated on the margins. Rosettes (and general habit) as in *S. soboliferum.* Tyrol, 1879. SYN. *S. cornutum.*

S. arvernense (Auvergne). *fl.*, petals pale pink, ¼in. to ½in. long; filaments and anthers red; panicle 2in. to 3in. long and broad, the lower flowers distinctly pedicellate. Summer. *l.* oblanceolate-cuneate, cuspidate, bright pale green, the outer ones 1in. to 1½in. long, the edges regularly ciliated. Flowering stem 6in. to 8in. long, the lower leaves about 1in. long. Barren rosettes 1½in. to 2½in. in diameter. Central France.

S. assimile (similar). *fl.* ⅜in. in diameter; calyx densely pubescent; petals pale rose, linear. July. *l.* sixty to eighty to a rosette, obovate-cuneate, cuspidate, pale glaucous-green, not red-tipped, shortly ciliated on the margins, minutely pubescent on the face, the outer ones ⅔in. to 1in. long. Flowering stem about 6in. long. Barren rosettes 1½in. to 2in. broad. Tyrol.

S. atlanticum (Atlantic).* *fl.* pale red, 1in. in diameter, twelve-parted; calyx segments twice as long as the tube; panicle short, 3in. to 4in. in diameter. Summer. *l.* oblanceolate-cuneate, cuspidate, pale green, glabrous when mature, scarcely tipped with red-brown, ciliated on the margins, the outer ones 1in. to 1½in. long. Flowering stem nearly 1ft. long, its leaves much tinted with red-brown. Barren rosettes 2in. to 3in. in diameter. Greater Atlas, 1873. (B. M. 6055, under name of *S. tectorum atlanticum.*)

FIG. 474. SEMPERVIVUM ARACHNOIDEUM LAGGERI.

S. aureum (golden).* *fl.* yellow; petals twenty, linear; stamens also twenty; panicle dichotomously-branched, many-flowered. July and August. *l.* obovate-spathulate, with membranously cartilaginous, quite entire margins, glaucous. Stem erect, glabrous. *h.* 1ft. Teneriffe, 1815. Greenhouse, herbaceous subshrub. SYNS. *S. Bollii, S. calyciforme* (B. R. 892), *Greenovia aureum* (B. M. 4087).

S. barbatulum (slightly bearded). *fl.* nine to twelve-parted; petals rose-red, ⅛in. long; panicle compact, few-flowered, densely pilose. *l.* oblanceolate, densely pubescent, ciliated on the margins, and furnished with a dense tuft of hairs at the tip, the outer ones about ½in. long. Flowering stem 3in. to 4in. high, its red-tinted, pubescent leaves ½in. to ¾in. long. Barren rosettes about ½in. in diameter. Alps. A well-marked, dwarf-habited plant.

S. Boissieri (Boissier's).* *fl.* 1in. in diameter, twelve to fourteen-parted; petals pale red, very hairy; filaments bright red; panicle about 2in. broad each way, the lower flowers sub-sessile. July. *l.* oblanceolate-cuneate, cuspidate, broadest near the middle, with rather long, brown cilia, hardly at all brown-tinted at top, 1in. to 1½in. long. Flowering stem 8in. to 9in. long, the leaves red-tinted, closely imbricated. Barren rosettes very dense, 2in. to 2½in. in diameter. 1878. A garden species.

S. Bollii (Boll's). A synonym of *S. aureum.*

Sempervivum—*continued.*

S. Boutignyanum (Boutigny's). *fl.* ⅜in. in diameter, twelve to fourteen-parted; petals pale rose, ⅜in. long, densely gland-ciliated; panicle 2in. to 3in. long and broad, simply branched, many-flowered. Summer. *l.* oblanceolate-cuneate, cuspidate, with a green, glabrous face and a distinct, decurrent, red-brown tip, the outer ones 1in. to 1½in. long. Flowering stem 6in. to 8in. long, its leaves 1in. or more long. Barren rosettes 2in. to 3in. broad. Pyrenees, 1878.

S. Braunii (Braun's).* *fl.* ten to twelve-parted, ⅜in. to 1in. in diameter; petals dull yellow, unspotted, with a green keel; filaments greenish, obscurely tinted with purple; panicle compact, many-flowered, 2in. to 4in. in diameter. July. *l.* thirty to forty to a rosette, obovate-cuneate, obscurely cuspidate, glandular-pubescent; outer ones obscurely purple-tipped, ⅜in. to 1in. long. Flowering stem 6in. to 9in. long, the upper part shortly pubescent, its leaves 1in. to 1½in. long. Barren rosettes 1½in. to 2in. in diameter. Tyrol, 1874.

S. cæspitosum (tufted). *fl.* yellow, disposed in cymose, dichotomously-branched corymbs; petals seven or eight, spreading. April to September. *l.* oblong-linear, glabrous, stiffly ciliated, marked with brown lines on both surfaces, crowded in a rosulate manner; cauline ones scattered. Stem very short, at length a little branched, leafy at the apex. *h.* 6in. Grand Canary Island, 1815. Greenhouse, evergreen shrub. This plant has been known to remain alive in an herbarium for eighteen months, and to grow when subsequently planted. SYN. *S. ciliatum* (B. M. 1978).

S. calcaratum (spurred).* *fl.* 1in. in diameter; petals dull red-dish white, ½in. long; panicle 6in. to 8in. long and broad, the lower branches deeply forked. Summer. *l.* 4in. long, ⅔in. to 1in. broad, rather glaucous, with a distinct red-brown tip, the edges bordered with stiff cilia. Flowering stem above 1ft. long. Barren rosettes 3in. to 4in. in diameter. 1874. A common form in English gardens, where it is variously known as *S. Camollei, S. italicum, S. juratum, S. Royeni, S. rusticanum,* and *S. Seguieri.*

S. calcareum (chalk-loving).* *fl.* ten to twelve-parted; corolla ⅜in. in diameter; petals pale red, greenish down the keel, densely ciliated; panicle 3in. to 4in. long and broad, eight to twelve-branched. Summer. *l.* oblanceolate-cuneate, cuspidate, very glaucous, with very distinct red-brown tips, stiffly ciliated on the margins, the outer ones 1in. to 1½in. long. Flowering stem less than 1ft. long, with densely imbricated leaves, 1in. to 1½in. long. Barren rosettes about 2in. in diameter. Calcareous Alps of Dauphiné. SYN. *S. californicum* (of gardens).

S. californicum (Californian). A garden synonym of *S. calcareum.*

S. calyciforme (calyx-formed). A synonym of *S. aureum.*

S. Camollei (Camolle's). A garden synonym of *S. calcaratum.*

S. canariense (Canary Islands).* *fl.* white, pedicellate; petals nine or ten, linear; branches of panicle expanded. June and July. *l.*, radical ones expanded, rosulate, obovate-spathulate, villous, large; cauline ones scattered, ovate. *h.* 1½ft. Canary Islands, 1699. A strong-growing, greenhouse, evergreen shrub.

S. ciliatum (ciliated). A synonym of *S. cæspitosum.*

S. cornutum (horned). A synonym of *S. arenarium.*

S. cruentum (bloody). *fl.* yellow, small, six to eight-parted. May. *l.* cuneate-spathulate, highly glabrous, thick, attenuated into the petiole, papillose on the margins, green and somewhat channelled above, slightly convex beneath. *h.* 1ft. to 2ft. Canary Islands, 1824. Greenhouse, evergreen shrub. (B. R. xxvii. 61, under name of *Æonium cruentum.*)

S. Doellianum (Doell's). *fl.* nine or ten-parted; calyx densely pubescent; petals bright red, lanceolate, ⅛in. long; filaments bright purple: panicle compact, few-flowered, the larger flowers distinctly pedicellate. June. *l.* forty to fifty to a rosette, oblanceolate, obscurely cuspidate, slightly hairy above, the edges minutely ciliated, the tips of the inner leaves connected by a few cobwebby threads; outer leaves ¼in. to ⅜in. long, red-tinted at back. Flowering stem 4in. to 6in. long, its leaves having only an obscure tuft of hairs at the tip. Barren rosettes ½in. to ⅔in. in diameter. Bernese Oberland. SYN. *S. heterotrichum.*

S. Fauconneti (Fauconnet's). *fl.* nine to twelve-parted, nearly 1in. in diameter; petals bright red, lanceolate, glandular on the back and edges; filaments bright purple. Summer. *l.* about fifty to a rosette, oblanceolate, obscurely cuspidate, the surfaces with a few glandular papillæ and streaks of purple, the edges ciliated with deflexed hairs, the outer leaves tinged with red, about ⅔in. long. Flowering stem 6in. to 8in. long, clothed with long hairs. Barren rosettes 1½in. in diameter. Jura Mountains. Rare in English gardens.

S. fimbriatum (fringed).* *fl.* about twelve-parted, 1in. in diameter; petals bright red, lanceolate, glandular on the back and edges; panicle open, the few branches bearing each six to ten flowers. July. *l.* fifty to sixty to a rosette, oblanceolate, obscurely cuspidate, all green, the edges crowded with deflexed hairs, the outer leaves turning red, and reaching ½in. to ⅔in. long. Flowering stem 6in. to 9in. high, densely glandular-pilose, the lower of the red-tinted leaves 1in. to 1½in. long. Barren rosettes 1in. to 1½in. in diameter. Alps of Dauphiné.

Sempervivum—*continued.*

S. flagelliforme (whip-like). *fl.* about twelve-parted, six to eight in a dense head, all sessile or nearly so; corolla bright red, above 1in. in diameter, densely glandular-pilose outside. June. *l.* forty to fifty to a rosette, oblanceolate, obscurely cuspidate, minutely downy above, pale green throughout, the edge fringed with short hairs, the outer ones ⅜in. long. Flowering stem 3in. to 4in. long, its imbricated leaves tipped with red-brown, the lowest about 1in. long. Barren rosettes 1in. to 1½in. in diameter, with the lax new ones on long, spreading stalks. Native place unknown. Well known in cultivation.

S. Funckii (Funck's).* *fl.* eleven or twelve-parted, nearly 1in. in diameter; petals bright red-purple, densely glandular-pubescent; panicle 2in. to 3in. in diameter, the lower flowers distinctly pedicellate. July. *l.* eighty to a hundred to a rosette, oblanceolate-cuneate, cuspidate, green and glabrous at maturity, not tipped with red-brown, fringed with dense, marginal cilia, the outer ones ¼in. to ⅜in. long. Flowering stem 6in. to 9in. long, densely pilose, the lower leaves 1in. long. Barren rosettes 1½in. to 2in. in diameter, surrounded by a dense circle of young ones on bright red, decumbent footstalks. Tyrol, &c. (B. H. 1873, 13, under name of *S. Funckii aqualiense.*)

S. glaucum (glaucous). *fl.* 1in. in diameter; petals bright red, more than twice as long as the calyx; filaments deep purple; panicle short, 2in. to 3in. in diameter, the branches few-flowered. Summer. *l.* oblanceolate-cuneate, cuspidate, glabrous, ciliated on the margins, having only a faint red-brown spot at the tip. Flowering stem 6in. to 9in. long, densely hairy above. Barren rosettes 2in. to 3in. in diameter. Simplon Alps.

S. globiferum (globe-bearing). A synonym of *S. grandiflorum.*

S. glutinosum (clammy). *fl.* golden-yellow; petals eight to ten; panicle loosely branched. July and August. *l.* cuneiform, viscid, rather scattered, fringed with adpressed, cartilaginous ciliæ. *h.* 2ft. Madeira, 1777. Greenhouse, evergreen shrub. (B. M. 1963; B. R. 278.)

S. grandiflorum (large-flowered). *fl.* few, very large, ten to twelve-parted, sub-sessile, in a dense head; corolla 1¼in. to 1½in. in diameter; petals pale yellow, with a flush of purple inside at the base; stamens generally bright mauve-purple. Summer. *l.* about forty to a rosette, obovate-cuneate, obscurely cuspidate, pubescent, the very tip reddish-brown; outer ones spreading, ⅜in. to 1in. long. Flowering stem 3in. to 4in. high, densely pubescent, its crowded leaves ⅜in. to 1in. long. Barren rosettes about 1½in. in diameter, the new ones on decumbent peduncles 1in. to 2in. long. Native country unknown. (B. M. 2115; B. M. 507, under name of *S. globiferum.*)

S. Greenii (Green's). *fl.* eleven or twelve-parted, ½in. in diameter; petals pale red, densely ciliated; filaments bright mauve-purple; panicle 1½in. to 2in. broad, three or four-branched. July. *l.* forty to fifty to a rosette, oblanceolate-cuneate, cuspidate, glaucous, with a distinct brown-red tip, ciliated on the edges, the outer ones ⅜in. to 1in. long. Flowering stem 6in. to 12in. long, its hairy, red-tinted leaves ⅜in. to 1in. long. Barren rosettes about 1½in. in diameter. Probably the French Alps. 1877.

S. heterotrichum (variably hairy). A synonym of *S. Doellianum.*

S. Heuffelii (Heuffel's).* *fl.* six-parted; calyx bright red-brown when old; petals pale straw-yellow, ⅜in. long, permanently erect, with three small cusps; panicle dense, many-flowered, 2½in. to 3in. in diameter, the lower flowers pedicellate. August. *l.* thirty to forty to a rosette, obovate-cuneate, distinctly cuspidate, the upper third, or even half, tinted with bright red-brown, the margins stiffly ciliated; outer leaves spreading, ¾in. to 1in. long. Flowering stem 6in. to 8in. long, densely pubescent, its close, red-brown leaves ⅜in. to 1in. long. Barren rosettes 1½in. to 2in. in diameter. Transylvania and Greece. (R. G. 858, Fig. 2, under name of *S. patens.*)

S. hirtum (hairy). *fl.* usually six-parted; petals pale yellow, ½in. to ⅝in. long, lanceolate, the point tricuspidate; panicle few or many-flowered, 1½in. to 4in. in diameter. June. *l.* about fifty to a rosette, obovate-cuneate, finely glandular-pubescent, ciliated down the margins; outer ones faintly tinted with red, ½in. to ⅝in. long. Flowering stem 6in. to 9in. long, densely pilose, the crowded leaves pubescent. Barren rosettes 1in. to 1½in. in diameter, not globular. Central Europe, 1804. (A. F. P. 65.)

S. hirtum (hairy). A synonym of *S. soboliferum.*

S. holochrysum (wholly golden). *fl.* golden, glabrous; hypogynous scales broad, truncate, very slightly emarginate; panicle 9in. long, very dense, pyramidal. December to February. *l.* dark green, spathulate, obtuse, glabrous, shining, cartilaginously ciliated, attenuated-tetragonal at base, red-margined at apex. Stem shrubby, erect. Teneriffe, 1816. Greenhouse. SYN. *S. urbicum* (B. R. 1741).

S. italicum (Italian). A garden synonym of *S. calcaratum.*

S. juratum (sworn). A garden synonym of *S. calcaratum.*

S. Lamottei (Lamotte's).* *fl.* 1in. in diameter, twelve to sixteen-parted; calyx densely pilose; petals pale pink; filaments bright purple; panicle like that of *S. tectorum.* Summer. *l.* obovate-cuneate, cuspidate, glabrous on the faces; outer ones 1¼in. to 1½in. long, with stiff marginal cilia, and very faintly red-brown tinted at the tip. Flowering stem often above 1ft. long. Barren rosettes 3in. to 4in. in diameter. Central France.

S. Moggridgei (Moggridge's).* *fl.* red, cymose, ⅜in. in diameter; calyx cup-shaped, glandular-pubescent; petals twice as long as the sepals, spreading. September. *l.* ⅜in. long, elongate-cuneate or oblanceolate, green, glabrous, with minutely ciliated margins and acute tips; lower cauline ones pale green and reddish. Flowering stem 9in. high, stout, leafy. Rosettes 2in. in diameter, of about a hundred leaves. Alps, 1881. (B. M. 6610.)

S. monanthes (one-flowered). *fl.* purplish, small; petals six to nine, scarcely longer than the calyx; scales obcordate; peduncles naked, generally one, rarely few, flowered. July to September. *l.* terete, clavate, glabrous, crowded in a rosulate manner. *h.* 1in. to 2in. Canary Islands, 1777. A very dwarf, greenhouse, evergreen shrub. (B. M. 93.)

S. montanum (mountain).* *fl.* twelve to fourteen-parted; petals bright mauve-purple, ¼in. to ⅜in. long, linear, acuminate; panicle very dense, ½in. to 2in. in diameter, the branches very pilose, and the lowest flowers nearly sessile. June. *l.* tightly packed, sixty to eighty to a rosette, oblanceolate-cuneate, cuspidate, entirely green, slightly pilose on the face, regularly ciliated on the margins, the outer ones ⅜in. to 1in. long. Flowering stem about 6in. long, the densely imbricated leaves tipped with red-brown, the lower ones 1in. to 1½in. long. Barren rosettes 1½in. to 1⅝in. in diameter. Alps and Pyrenees. (J. F. A. v. 41.)

S. oligotrichum (few-haired). *fl.* about ten-parted, ⅜in. in diameter, in a dense head; petals bright red; filaments bright purple. Summer. *l.* thirty to forty to a rosette, oblanceolate, obscurely cuspidate, minutely pubescent, the edges minutely ciliated; inner ones connected by a few cobwebby threads, which nearly or quite disappear at flowering time; outer ones about ½in. long. Flowering stem 2in. to 4in. long, its leaves bright red and densely pubescent. Barren rosettes about 1in. in diameter. Tyrol.

S. Paivæ (Baron Paiva's). *fl.* green, scentless, ⅜in. broad; petals erecto-patent, acuminated, with recurved and spirally twisted tips. August. *l.* highly glaucous, 1in. to 2½in. long, ½in. to 1in. broad, those of the flowering branches thick and fleshy, of the barren ones thinner, and finely serrulate-ciliated. Canary Islands, 1866. A low, straggling, greenhouse, evergreen shrub. (B. M. 5593.)

S. parvulum (rather small). *fl.* ⅜in. in diameter; petals pale red; panicle short, corymbose, about 2in. in diameter. July. *l.* oblanceolate-cuneate, cuspidate, with a distinct, red-brown tip, minutely but stiffly ciliated on the edges, the outer ones about 1in. long. Flowering stem 6in. to 12in. long, very pilose, its leaves red-brown, the lowest ⅜in. to 1in. long. Barren rosettes 1in. to 1½in. in diameter. Alps of Dauphiné, 1878. A rare form in cultivation.

S. Pittoni (Pitton's). *fl.* nine to twelve-parted, ten to twenty in a dense head, 1½in. to 2in. in diameter, densely pilose; petals primrose-yellow, whitish inside towards the base, ⅜in. long, lanceolate; filaments pale. July. *l.* sixty to eighty to a fully-developed barren rosette, oblanceolate, tipped with claret-purple, densely and persistently pubescent, the tip deltoid-cuspidate; outer ones about ⅜in. long. Flowering stem 4in. to 6in. long, densely pilose, its leaves tipped with claret-purple. Barren rosettes 1in. to 1½in. in diameter, the young ones sessile. Alps of Styria.

S. Pomelii (Pomel's).* *fl.* ten to twelve-parted; corolla bright rose-red, about 1in. in diameter; petals widely spreading; panicle 3in. to 4in. in diameter, its simple branches bearing six to twelve flowers. July. *l.* fifty to sixty to a rosette, oblanceolate, distinctly cuspidate, with a few hairs on both surfaces, the outer ones tinged with red, ⅜in. to 1in. long. Flowering stem 6in. to 9in. long, densely pilose, its hairy leaves much imbricated, the lower ones 1in. to 1½in. long. Barren rosettes 1½in. to 1⅜in. in diameter. Auvergne.

S. Reginæ-Amaliæ (Queen Amalia's of Greece). *fl.* six or seven-parted; petals pale yellow, ligulate, obtuse; panicle dense, many-flowered, capitate, the lowest flowers shortly pedicellate. Summer. *l.* a hundred or more to a rosette, obovate-cuneate, distinctly cuspidate, bright purplish-brown in the upper half, the edges ciliated; outer ones spreading, 1in. to 1½in. long. Flowering stem 6in. high, densely pubescent, the crowded leaves brown. Barren rosettes about 3in. in diameter. Greece.

S. Royeni (Royen's). A garden synonym of *S. calcaratum.*

S. rusticanum (rustic). A garden synonym of *S. calcaratum.*

S. ruthenicum (Russian). *fl.* about twelve-parted; petals pale yellow, linear, not more than ⅜in. long; filaments finally bright mauve-purple; panicle short and compact, densely pubescent. Summer. *l.* forty to fifty to a rosette, obovate-cuneate, cuspidate, slightly glandular-pubescent, ciliated at edges with short, decurved hairs; outer ones tinted at back, ⅜in. to 1in. long. Flowering stem 6in. to 12in. long, shortly pubescent upwards. Barren rosettes 1½in. in diameter. South-east Russia, &c.

S. Schottii (Schott's). *l.* twelve to fourteen-parted; lower ones densely sessile; petals pale red, with a deeper keel, twice as long as the calyx; filaments deep purple; panicle short and compact, 2in. to 3in. in diameter. Summer. *l.* oblanceolate-cuneate, cuspidate, glabrous, ciliated on the margins, scarcely tipped with red-brown, the outer ones 1in. to 1¼in. long. Flowering stem nearly 1ft. long, its oblong-lanceolate, red-tinted leaves 1in. to 1½in. long. Barren rosettes 2in. to 3in. in diameter. Tyrol, 1874.

Sempervivum—*continued.*

S. Seguieri (Seguier's). A garden synonym of *S. calcaratum.*

S. Smithii (Smith's). *fl.* pale yellow, sessile; petals twelve, oval-oblong, spreading; branches of the panicle revolute at the points, bearing flowers on the upper side. July and August. *l.* scattered, obovate, acuminate, flat, concave, slightly spotted. Stem erect, hispid. *h.* 1ft. Canary Islands, 1815. Greenhouse, evergreen shrub. (B. M. 1980.)

S. soboliferum (sobole-bearing).* Hen-and-Chickens Houseleek. *fl.* six or seven-parted; petals pale yellow, lanceolate, ¼in. long, obscurely tricuspidate; panicle short, dense, many-flowered, 3in. to 4in. in diameter, the lower flowers distinctly pedicellate. Summer. *l.* sixty to eighty to a rosette, obovate-cuneate, obscurely cuspidate, minutely ciliated on the edges; outer ones tinted with bright red-brown, ⅜in. to 1in. long. Flowering stem 6in. to 9in. long, very robust, quite hidden by the leaves. Barren rosettes globose, 1in. to 1½in. in diameter; the copious new sessile ones attached to the parent only by a slender thread. Austria. A well-known garden plant. (B. M. 1457; J. F. A. 12, under name of *S. hirtum.*)

S. stellatum (star-like). *fl.* golden-yellow, panicled; petals six to eight, spreading; scales palmate, with subulate lobes. July and August. *l.* scattered, oblong, spathulately cuneiform, obtuse, villous. Stem erect, branched, puberulous. *h.* 6in. Madeira, 1790. Greenhouse annual. (B. M. 1809, under name of *S. villosum.*)

S. tabulæforme (table-formed).* *fl.* very pale sulphur-coloured; petals ten to twelve, linear-lanceolate; glands minute, pedunculate. June and July. *l.* spathulate, flat, ciliated, attenuated at base, crowded at the top of the stem, and forming a flat, rosulate disk, in consequence of being so closely imbricated over each other. *h.* 1ft. Madeira, 1817. Greenhouse, evergreen shrub.

S. tectorum (roof-loving). Bullock's Eye; Common Houseleek; Jupiter's Beard; Sengreen. *fl.* ⅜in. to 1in. in diameter; petals linear, pale red, keeled with deeper red; filaments bright purple; panicle 5in. to 6in. long, with ten or twelve scorpioid branches. July. *l.* fifty to sixty to a rosette, obovate-cuneate, cuspidate, 1½in. to 2in., or finally 3in., long, pale green, with a distinct red-brown tip, the edges ciliated. Flowering stem about 1ft. long, densely pilose. Barren rosettes 3in. to 4in. in diameter. Britain (but not indigenous). (Sy. En. B. 538.)

S. t. atlanticum (Atlantic). *See* **S. atlanticum.**

S. tortuosum (twisted). *fl.* yellow; petals seven or eight, spreading; scales two-lobed. July and August. *l.* obovate-spathulate, scattered, rather convex beneath, nearly or quite 1in. long and ¼in. broad. Stem erect, branched. *h.* 6in. to 9in. Canary Islands, 1779. Greenhouse, evergreen shrub. (B. M. 296.)

S. triste (sad). *fl.*, calyx deeply tinted with red-brown; corolla bright red, 1in. in diameter; panicle 6in. long, 3in. to 4in. in diameter, the larger flowers distinctly pedicellate. Summer. *l.* oblanceolate-cuneate, cuspidate, glabrous, the margins shortly ciliated, the whole upper part, both back and face, suffused with red-brown. Flowering stem as robust as in *S. tectorum*, its leaves strongly tinted with red-brown, the lower ones 2in. to 3in. long. Barren rosettes 2in. to 3in. in diameter. A rare garden form.

S. urbicum (city), of Lindley. A synonym of *S. holochrysum.*

S. Verloti (Verlot's). *fl.* twelve to fourteen-parted, ⅜in. to ½in. in diameter; petals rose-red, densely ciliated on the back and edge; filaments bright purple; panicle 3in. to 4in. in diameter, each of the simple branches eight to twelve-flowered. July. *l.* about fifty to a rosette, oblanceolate-cuneate, cuspidate, faintly glaucous, only red-brown at the extreme tip, ciliated on the margins, the outer ones ⅜in. to 1in. long. Flowering stems 6in. to 9in. long, the lowest leaves about 1in. long. Barren rosettes 1½in. to 2in. in diameter. Alps of Dauphiné.

S. villosum (villous). *fl.* yellow, with fringed scales. June and July. *l.* obovate, crowded, gibbous beneath, villous, five lines long, three lines broad. Stem rather erect, twisted. *h.* 6in. to 9in. Canary Islands, 1777. Greenhouse, evergreen shrub. (B. R. 1553.)

S. Wulfeni (Wulfen's).* *fl.* twelve to fourteen-parted; petals pale yellow, ½in. long, linear; filaments bright mauve-purple; panicle short, dense, 2in. to 3in. in diameter, densely pilose. Summer. *l.* about fifty to a rosette, obovate-cuneate, cuspidate, slightly glaucous, faintly tinted with red-brown at the tip, the edges ciliated; outer ones ⅜in. to 1in. long. Flowering stem 6in. to 9in. long, densely pilose upwards, its lancelolate leaves 1in. to 1½in. long. Barren rosettes 1½in. to 2in. in diameter. Central Europe. Habit of *S. tectorum.* (J. F. A. sup. 40, under name of *S. globiferum.*)

S. Youngianum (Young's). *fl.* yellow. June. *l.* sub-cartilaginous, thick, shining green, obcordate-spathulate, sub-tetragonal at base, obsoletely mucronate at apex, shortly ciliated on the margins. Stem thick. *h.* 3ft. Canary Islands, 1843. Greenhouse, evergreen shrub. (B. R. xxx. 35, under name of *Æonium Youngianum.*)

SENACIA. Included under *Pittosporum.*

SENARY. In sixes.

SENECA, SENEGA, or SENEKA SNAKE-ROOT. *See* **Polygala Senega.**

SENECIO (the old Latin name used by Pliny, and derived from *senex*, an old man; alluding to the usually white, hair-like pappus). Groundsel; Ragweed. Including *Adenotrichia, Brachyrhynchos, Cacalia, Cineraria* (in part), *Farfugium, Gynoxys* (in part), *Jacobæa, Kleinia* (of Haworth), *Ligularia, Pericallis, Senecillis*, and *Syneilesis* (*Cacalia, Cineraria*, and *Ligularia*, are, however, for garden purposes, kept distinct in this work). ORD. *Compositæ.* A vast genus—probably the most extensive in the vegetable kingdom—comprising, according to Bentham and Hooker, nearly 900 species of stove, greenhouse, or hardy, annual, biennial, or perennial herbs, sub-shrubs, or shrubs, rarely arborescent, dispersed over the whole globe, but most numerous in temperate or mountainous regions. Flower-heads radiate-heterogamous or discoid-homogamous, solitary or corymbose, very rarely disposed in pyramidal panicles, sub-racemose or sessile at the sides of the branches; involucral bracts in one series, with sometimes a few smaller ones at the base, at length often reflexed; receptacle flat or slightly convex; ray florets, when present, variously coloured, one-seriate, ligulate; disk yellow, whitish, or rarely purplish or violet; achenes glabrous or slightly villous, of variable form and size. Leaves alternate or radical, entire, toothed, lobed, or variously (often pinnately) dissected. The genus is represented in Britain by nine species (two of which, however, are not indigenous, but have become naturalised), including the Ragweed or Ragwort (*S. Jacobæa*) and Groundsel (*S. vulgaris*). South Africa is richest in species in the Old World, and the Andean region in the New. A representative selection of the plants best known to horticulturists is given below. Senecios are easy to grow; they succeed in almost any loamy soil. The annuals may readily be increased by seeds, which, in many instances, ripen in abundance. Other representatives of the genus may be propagated by seeds, by divisions, or by cuttings both of the shoots and roots. *See also* **Cacalia, Cineraria,** and **Ligularia.**

S. aconitifolius (Aconite-leaved). *fl.-heads* pinkish-red, small, discoid, disposed in loose corymbs. *l.* on long petioles, palmately parted; lobes several, with a few strong teeth. Stem tall, striated. Amur, North China, 1877. A hardy perennial, of little beauty. SYN. *Syneilesis aconitifolia* (R. G. 887).

S. Adenotrichia (Adenotrichia). *fl.-heads* yellow: involucre campanulate, biseriate, the outer scales linear-subulate; ray florets twelve to fifteen. May. *l.* auriculate-amplexicaul, oblong, pinnatifid, unequally toothed. Branches nearly naked at apex, dichotomously sub-corymbose. *h.* 2ft. Chili, 1826. Greenhouse, glandular-pilose sub-shrub. (B. R. 1190, under name of *Adenotrichia amplexicaulis.*)

S. ampullaceus (bottle-shaped). *fl.-heads* yellow, about 1in. in diameter, in a corymbose panicle; involucre at length bottle-shaped; ray florets few, spreading. July. *l.* oblong, obtuse, fleshy, deeply toothed, sub-cordate at base, semi-amplexicaul. Stems striated, branched above. *h.* 2ft. Texas, 1834. An erect, highly glabrous, half-hardy annual. (B. M. 3487.)

S. Anteuphorbium (so named "because of its being a reputed antidote against the acrid poison of the Cape *Euphorbium,*" Hooker). *fl.-heads* yellow, with a rose tinge, 1in. long, cylindric, erect, solitary, axillary; involucral bracts numerous; florets all tubular, scarcely exceeding the involucre; peduncles very stout, with a few scattered bracts. January. *l.* about 1in. long, erect, oblong or linear-oblong, acute or obtuse, fleshy, entire, on very short petioles. Stem thick, fleshy, cylindric; branches ½in. to 1in. in diameter, constricted at base. *h.* 3ft. to 4ft. South Africa, &c., 1596. Greenhouse, succulent shrub. (B. M. 6099.)

S. argenteus (silvery).* *fl.-heads* yellowish, solitary; involucre campanulate, scarcely bracteolate, with about twenty scales; ray florets about twelve, linear-oblong. Summer. *l.* linear, entire, obtuse; upper ones few, acute. Branches adpressedly silvery-tomentose. *h.* 1ft. to 2ft. Chili. Greenhouse under-shrub.

S. chordifolia (cord-leaved).* *fl.-heads* yellow, very few, ⅜in. long, narrow: involucral leaflets about sixteen, with a few bristle-shaped bracteoles at base; pappus white; cymes very slender, 6in. to 10in. long, sparingly forked, the branches erect. July. *l.* 7in. to 10in. long, ½in. in diameter, acute, cylindric, but flattened above towards the base. Stem slightly branched. *h.* 1ft. South Africa, 1862. A greenhouse, glabrous, fleshy sub-shrub. (B. M. 6216.)

S. concolor (one-coloured). *fl.-heads* 1½in. in diameter; ray florets mauve-purple; disk white; anthers purple; corymbs three to five-headed. Summer. *l.* glabrous; radical ones narrow-oblanceolate, toothed; cauline ones amplexicaul, broadly linear.

Senecio—*continued.*

Stem 1ft. to 2ft. high, loosely branched above. South Africa, 1882. A pretty, half-hardy perennial. (B. M. 6713.)

S. diversifolius pinnatifidus (variable-leaved, pinnatifid). *fl.-heads* purple, discoid; peduncles elongated, simple or branched, scaly. June. *l.* lanceolate-oblong, acute or acuminate, deeply pinnatifid; lobes in many pairs, toothed or incised, the uppermost two or three pairs confluent in a pinnatifid, terminal lobe. Stem erect, leafy below. *h.* 2ft. South Africa. Half-hardy perennial. SYN. *Brachyrhynchos albicaulis.*

S. Doria (Doria).* *fl.-heads* yellow; accessory involucral scales linear-subulate; ray florets five or six; corymbs compound, loosely sub-paniculate. August. *l.* toothed, rather thick, sub-glaucescent; radical ones petiolate, oval-oblong; cauline ones slightly amplexicaul, sub-decurrent, oblong-lanceolate. Stems erect, striated, glabrous. *h.* 4ft. South Europe, 1570. Hardy perennial. (J. F. A. 185.)

S. Doronicum (Leopard's Bane).* *fl.-heads* yellow, 2in. in diameter, solitary or few; involucre bracteate, campanulate, the scales lanceolate, acuminate; ray florets twelve to twenty-five, flat; achenes glabrous, striated. Summer. *l.* rather thick, toothed; radical ones lanceolate, elliptic, or ovate-cordate, on short or long petioles, sub-elliptic or obtuse. *h.* 1ft. South Europe, 1705. Hardy perennial. (J. F. A. v. 45.)

S. D. hosmariensis (Beni-Hosmar). *fl.-heads* rich yellow, on a scape 3in. to 5in. high. *l.*, radical ones 1in. to 1½in. long, ovate, elliptic-ovate, or ovate-cordate, acute or obtuse, irregularly toothed, dark green, rugose, and glabrous above, greenish-white beneath; cauline ones few, narrow. Beni-Hosmar, Morocco, 1874. A pretty rockwork plant. (B. M. 6101.)

S. elæagnifolius (Elæagnus-leaved). *fl.-heads* yellow, ½in. long, campanulate, rayless; panicle terminal, stout, branched, buff-woolly. *l.* ½in. to 1in. long, on stout petioles, obovate or lanceolate-oblong, obtuse, entire; branches buff-tomentose. *h.* 6ft. to 8ft. New Zealand. Greenhouse shrub.

S. elegans (elegant).* *fl.-heads* radiate, showy, on long, scaly pedicels; involucre calycled with many ciliated, black-tipped bracteoles; ray florets purple; disk yellow. *l.* 1½in. to 3in. long, ear-clasping at base, petioled, extremely varied in shape and degree of incision. Stems erect, 1ft. to 2ft. high, or diffuse. South Africa. A viscous-pubescent, half-hardy annual or biennial. A variety with double flowers is the well-known "American Groundsel" of our gardens.

S. e. erectus (erect). *fl.-heads*, involucral scales glabrous. *l.* frequently pinnate or bipinnatipartite. Stem erect, slender. (B. M. 238, under name of *S. elegans.*)

S. fulgens (brilliant). *fl.-heads* bright orange-vermilion, erect or inclined, 1½in. long; involucre terete, the leaflets eight to ten, acute; florets slender, tubular, with linear-oblong lobes; peduncles 4in. to 8in. long, erect, loosely clothed with succulent bracts. May. *l.* succulent, 4in. to 6in. long, on short, broad petioles, obovate-oblong, sub-acute, remotely serrated, smooth. Stems branched, terete. *h.* 2ft. to 3ft. Natal, 1866. A greenhouse, succulent sub-shrub, covered with pale green, glaucous bloom. (B. M. 5590, under name of *Kleinia fulgens.*)

S. Ghiesbreghtii (Ghiesbreght's). A synonym of *S. grandifolius.*

S. glastifolius (wood-leaved). *fl.-heads* purple, radiate; involucre amply calycled with subulate bracteoles; panicle many-headed, loosely corymbose. June. *l.* oblong or oblong-lanceolate, 1in. to 3in. long, acute, coarsely and unequally toothed, half-amplexicaul, the lower ones more or less decurrent. Stems erect, branching. *h.* 4ft. South Africa, 1826. Greenhouse sub-shrub. (B. R. 1342, under name of *S. lilacinus.*)

S. grandiflorus (large-flowered). *fl.-heads* in a loosely corymbose panicle; involucre amply calycled with many subulate, spreading bracteoles; ray florets purple; disk yellow. August. *l.*, cauline ones sessile, half-amplexicaul, 3in. to 6in. long, pinnatipartite; lobes several on each side, linear, acuminate. Stems 4ft. to 5ft. high, naked at top. South Africa, 1774. Greenhouse perennial. (B. R. 901, under name of *S. venustus.*)

S. grandifolius (large-leaved). *fl.-heads* yellow, in a terminal corymb. *l.* deep green, about 1ft. long, coarsely toothed or lobed. Stems deep purple, curiously spotted or warted. *h.* 3ft. to 4ft. Mexico. A half-hardy shrub, useful for massing or isolating on the lawn as a foliage plant. SYN. *S. Ghiesbreghtii.* (R. G. 296.)

S. Haworthii (Haworth's). *fl.-heads* orange-yellow, solitary, erect, 1½in. long, cylindric, discoid; involucral scales appressed, shorter than the florets; peduncle terminal, 2in. long. July. *l.* 1in. to 2in. long, cylindric or ellipsoid, acute, narrowed into short petioles. Stem erect; branches cylindric. South Africa, 1873. A small, succulent, greenhouse under-shrub, clothed with soft, snow-white wool. (B. M. 6063.)

S. incanus (hoary). *fl.-heads* yellow, disposed in a simple, somewhat crowded corymb; involucre about half as long as the florets; calyces few. August. *l.* bright silvery; lower ones obovate, with incised lobes, the upper ones overlapping; upper leaves oblong, with separate, linear leaflets. Stems tufted. *h.* 3in. to 6in. Alps. A pretty and compact, hardy perennial, altogether white with adpressed hairs.

S. Kæmpferi aureo-maculata (Kæmpfer's gold-spotted). A synonym of *Ligularia Kæmpferi aureo-maculata.*

S. laciniatus (torn). "*l.* slender, pale green, finely cut into long, narrow lobes, drooping gracefully from the upper part of the

Senecio—*continued.*

slender, half-woody stems. This half-hardy sub-shrub is one of the most elegant of all foliage plants. It should not be allowed to flower" ("Thompson's Gardeners' Assistant").

S. Lagopus (hare's-foot). *fl.-heads* bright yellow, radiate, ½in. to 1in. in diameter, on slender pedicels; pappus hairs white; scape 2in. to 6in. high, branched above, two to eight-headed. Summer. *l.* 1in. to 4in. long, on short, stout, villous petioles, broadly cordate-oblong, rounded at the tip, white-woolly beneath, wrinkled and covered with bristles above. Crown of the root loaded with matted hairs. New Zealand, 1882. Hardy, perennial, rockwork plant.

S. macroglossus (large-tongued).* Cape Ivy. *fl.-heads* on long, axillary peduncles; ray florets eight to twelve, pale yellow, forming a limb about 3in. across, multiseriate. Summer. *l.* petiolate, hastate, with acuminate basal lobes, or cordate, acute or acuminate, entire, or with one or two broad teeth or lobules on each side. Stems smooth and glossy. South Africa, 1875. A greenhouse, evergreen, soft-wooded climber, with Ivy-like leaves; it is well suited for training to a rafter. (B. M. 6149; F. d. S. 2188; G. C. n. s., iii. p. 749.)

S. mikanioides (Mikania-like).* German Ivy. *fl.-heads* yellow, discoid; involucre sparingly calycled, of eight or nine narrow scales; corymb generally much-branched. December. *l.* somewhat fleshy, petiolate, sharply five to seven-angled or lobed, hastate or cordate at base, the lobes deltoid or obsolete, with broad, shallow interspaces; petioles 1in. to 1½in. long. *h.* several feet. South Africa, 1855. A much-branched, climbing, greenhouse sub-shrub, forming an admirable window creeper. SYN. *Mikania senecioides* (of gardens).

S. multibracteatus (many-bracted). *fl.-heads* sub-corymbose, on very long, copiously scaly pedicels; involucre of many dark-tipped, glabrous scales, amply calycled with many imbricating bracts; ray florets purple; disk yellow. Summer. *l.* 2in. to 2½in. long; cauline ones sessile, not auricled, lanceolate, coarsely few-toothed, tapering at base; rameal ones stem-clasping, coarsely toothed at base. Stems 1ft. to 1½ft. high, branched above. South Africa, 1872. A sparsely pubescent, greenhouse annual. (Ref. B. 251.)

S. præcox (early). *fl.-heads* yellow, appearing before the leaves, on elongated pedicels; involucre cylindrical, eight to ten-leafleted, almost ebracteate; ray florets five, spreading; corymbs branched, seven or eight-headed. June. *l.* petiolate, cordate, acute, five to seven-angled or lobed, membranous. Stem fleshy-shrubby, branched, terete. *h.* 2ft. Mexico. A glabrous, greenhouse sub-shrub. (B. M. 4803.)

S. pteroneura (wing-nerved). *fl.-heads* pale straw-colour, solitary, or two or three at the tips of the branches, erect, cylindric, scarcely ⅔in. long; involucral scales brownish-red about the middle; florets narrow, slender; peduncles very stout, longer than the involucre. November. *l.* only developed on very young shoots, elliptic or lanceolate, ¼in. to ⅔in. long. Stems 4ft. to 8ft. high, loose, nearly erect; branches ⅓in. in diameter, nearly straight, obtuse. Morocco, 1872. A highly glabrous, glaucous, fleshy-shrubby, greenhouse plant. (B. M. 5945.)

FIG. 475. SENECIO PULCHER.

S. pulcher (pretty).* *fl.-heads* large, corymbose; involucre very broadly campanulate, calycled with pubescent-woolly, obtuse

Senecio—*continued.*

leaflets; ray florets nearly twenty, purple, longer than the yellow disk. Summer and autumn. *l.* oblong-lanceolate, crenate-toothed; radical ones petiolate; cauline ones sessile; upper ones half-amplexicaul, and slightly decurrent. Stem simple or branched. *h.* 1ft. to 2ft. Uruguay, 1872. A pretty, cobwebby-tomentose, hardy perennial. See Fig. 475. (B. M. 5959; R. H. 1877, p. 94.)

S. pyramidatus (pyramidal).* *fl.-heads* yellow, many, ¾in. in diameter, exclusive of the ten or twelve broad, spreading ray florets, disposed in a long, thyrsoid raceme, 6in. to 12in. long; involucre sub-calyculate, campanulate, woolly, of ten to twelve very broad scales. Summer. *l.* sessile, sub-terete, fleshy, acute, 3in. long, two to three lines wide, glabrous or cobwebby. Stem shrubby, fleshy, erect, simple, closely leafy below, sparsely so above, tomentose. *h.* about 2ft. South Africa, 1863. A very fine, greenhouse species. (B. M. 5396.)

S. scaposus caulescens (scaped, caulescent). *fl.-heads* yellow; involucre cobwebby, scarcely calycled; ray florets about twelve; peduncles scape-like, 1ft. to 1½ft. long, naked or sparsely scaly, usually bearing three to five long-pedicelled heads. August. *l.* 2in. to 3in. long, crowded at the apex of the stem or branches, fleshy, broadly linear, very obtuse, terete, the young ones cobwebby, the older ones glabrous. Stem fleshy-shrubby, 1ft. high, branched. South Africa, 1843. Greenhouse. (B. M. 4011, under name of *S. calamifolius.*)

S. Skinneri (Skinner's). *fl.-heads* yellowish, fragrant, in terminal, corymbose racemes; ray florets few; bracteoles four to six, much spreading, subulate. June. *l.* alternate, rather long-petiolate, ovate or ovate-lanceolate, acute, slightly fleshy, entire, indistinctly veined. *h.* 3ft. Guatemala, 1840. A pretty, highly glabrous, greenhouse, perennial climber, with tuberous roots. (B. M. 4511; L. & P. F. G. i. p. 77, f. 54; and L. J. F. 18, under name of *Gynoxys fragrans.*)

S. speciosus (showy).* *fl.-heads* bright purple, 1¼in. in diameter, long-peduncled, in spreading corymbs; involucre densely glandular-hairy; ray florets six to twenty, narrow-linear; scape 1ft. or less high, with alternate, rather distant, erect leaves. July. *l.* 4in. to 7in. long, obovate, lanceolate, or narrowly linear-spathulate, crenately toothed or sinuately lobed, rarely sub-pinnatifid, sub-acute or obtuse, glandular-hairy. South Africa, 1789. Greenhouse perennial. (B. M. 6488; B. R. 41; L. B. C. 1113; G. C. n. s., xiv. p. 149; R. G. 1881, p. 310; A. B. R. 291, under name of *S. pseudo-china.*)

S. stenocephala comosa (narrow-headed, tufted). *fl.-heads* yellow, with three ray florets, disposed in a dense, narrow-oblong spike. Summer. *l.*, radical ones on long petioles, broadly ovate-sagittate, acuminate. Stem 2ft. high. Japan, 1881. A striking and ornamental, hardy perennial. (G. C. n. s., xvi. p. 301.) The flower-heads in the typical form possess but one ray floret each.

S. sub-scandens (somewhat climbing). *fl.-heads* ¼in. long, cylindric; involucral bracts five, red-tipped; florets about ten, dark ochreous-yellow, exceeding the involucre; pappus snow-white; cymes axillary and terminal, long-peduncled, much-branched. January. *l.* 5in. to 9in. long, pink-veined, pinnatiparted; lateral lobes two to six pairs, ovate or orbicular, distant, adnate, coarsely sinuate-toothed; terminal one deltoid, deeply cordate at base. Stems and branches cylindric, succulent. South Africa, 1873. A tall, herbaceous climber. (B. M. 6363.)

S. uniflorus (one-flowered). *fl.-heads* yellow, few on long stalks, or solitary; involucre turbinate, half as long as the disk; ray florets expanding. July. *l.*, lower ones divided, stalked, oblong; upper ones sessile, linear, entire. *h.* 3in. Alps of Europe, 1785. A pretty, cano-tomentose, hardy perennial, allied to *S. incanus.* (A. F. P. 17.)

SENEGA. Included under **Polygala** (which *see*).

SENGREEN. A popular name for *Saxifraga nivalis* and *Sempervivum tectorum.*

SENNA. The leaves of *Cassia acutifolia, C. angustifolia,* and other allied species.

SENNA, BLADDER. *See* **Colutea.**

SENNA, SCORPION. *See* **Coronilla Emerus.**

SENSITIVE BRIAR. *See* **Schrankia uncinata.**

SENSITIVE PLANT. *See* **Mimosa.**

SEPAL. One of the parts that, together, form the calyx, or outermost whorl of a flower. The Sepals are usually green, and unlike the petals (*e.g.*, in the Rose), but may resemble them (*e.g.*, in the Tulip). They may be free from one another, but often are more or less closely united by their edges to form a tube or cup. Their chief use is to protect the more delicate inner organs of the flowers from injury while growing.

SEPALINE, SEPALOUS. Relating to sepals.

SEPALODY. A name used to indicate the change of petals, &c., into sepals or sepaloid organs.

SEPALOID. Resembling a sepal.

SEPTAS (of Linnæus). Included under *Crassula.*

SEPTAS (of Loureiro). A synonym of *Herpestis.*

SEPTATE. Separated by a partition or septum.

SEPTFOIL. A common name for *Potentilla Tormentilla.*

SEPTICIDAL. When a capsule dehisces through the dissepiments or lines of junction.

SEPTIFEROUS. Partition-bearing.

SEPTIFRAGAL. "A mode of dehiscing, in which the backs of the carpels separate from the dissepiments, whether formed by their sides or by expansions of the placenta" (Lindley).

SEPTORIA. *See* **Sphæropsideæ.**

SEPTUM. A partition.

SEQUOIA (derivation obscure, but it has been suggested that it is "a modification of *See-qua-yah,* the name of a celebrated Cherokee chief," Hemsley). SYNS. *Gigantabies, Washingtonia* (of Winslow), *Wellingtonia.* ORD. *Coniferæ.* A small genus (two species) of gigantic, hardy, evergreen, densely branched, Californian trees. Flowers monœcious, the males in the upper axils or at the tips of the branchlets, solitary; female catkins terminal, ovoid or oblong. Leaves alternate, spirally affixed, in *S. sempervirens* often sub-lanceolate and distichously spreading, in *S. gigantea* frequently much shorter, more obtuse, and appressedly imbricated, but leaves of both forms are sometimes observable in each species. Cones ½in. to 1½in. long. "The timber is of a beautiful red colour, fine and close-grained, but light and brittle, and never attacked by insects. It is the Californian Redwood or Bastard-tree of the settlers" (Gordon, "The Pinetum"). The following interesting particulars respecting the dimensions of these trees in a grove in Yo Semite Valley, are gleaned from the "Gardeners' Chronicle," n. s., x. 240: "The grove contains between ninety and a hundred big specimens of the *Sequoia gigantea,* growing out of the thick forest. The 'Father of the Forest,' a great prostrate trunk, measures 435ft. in length, and 110ft. in circumference. He must have been much longer when living. Along the inside of the fallen trunk is a tunnel 35ft. long, and, in places, 8ft. to 10ft. high. The 'Mother of the Forest,' standing at the farther end of the grove, is 327ft. high, and 90ft. in circumference. She stands quite dead and bare, having suffered from the ravages of fire, and is entirely barkless from top to bottom. A great living monster is the 'Pioneer's Cabin,' probably so called from a recess in the lower part of the trunk big enough to hold a large family party at breakfast. The circumference of this tree 5ft. from the ground is 92ft. by our own measuring. Perhaps the most beautiful of the trees in the grove are three named 'The Three Graces.' They stand only a few feet apart, and, with their branches intertwining, run up to an almost equal height of 265ft. Another great tree is called the 'Key Stone State,' 325ft. high; its branches begin at 150ft. from the ground. But perhaps the greatest curiosity is a big fellow, which has been purposely thrown, cut off 6ft. above the ground, and a pavilion built on the standing stump. There is room enough in the pavilion for a very pretty dance—space for two sets of Lancers, or for sixteen couples to spin round with ease. We measured the dancing space, and found the diameter 30ft., less 20in.; the circumference, 85ft."

Sequoias are readily propagated by means of cuttings, inserted in sandy loam, under a hand glass, in autumn, and kept shaded from bright sunlight, in a somewhat moist atmosphere, until roots are formed. The variegated forms

Sequoia—*continued.*

are better grafted. All are almost indifferent as to soil. When seeds are to be had, they should be sown in a cold frame, in spring, and the seedlings transplanted, as soon as they are large enough to handle, to the open ground.

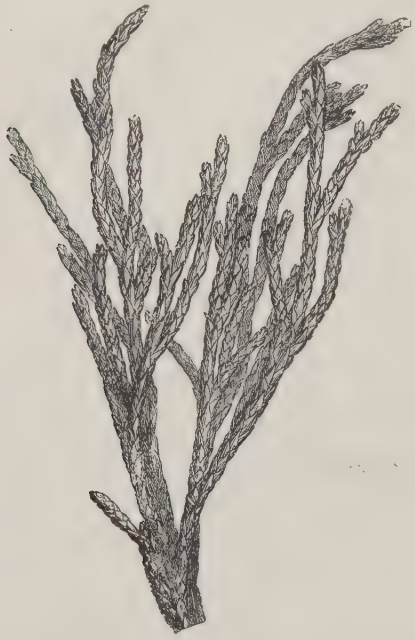


FIG. 476. YOUNG BRANCH OF SEQUOIA GIGANTEA.

S. gigantea (gigantic).* Big-tree; Mammoth-tree. *l.* needle-shaped, spirally alternate, spreading, light green on young plants; those on adult trees scale-formed, closely inlaid, rounded at back, concave above; those on the branchlets much shorter, very close, and regularly imbricated; those on the larger branches longer, looser, decurrent at base, and tapering to an acute point. *cones* solitary on the ends of the branchlets, 2in. long, ovate, blunt. Branches horizontal, much divided; branches cylindrical, frequently pendulous, thickly leafy. 1853. See Figs. 476 and 477. SYN. *Wellingtonia gigantea* (B. M. 4777-8; F. d. S. 892-3).

FIG. 477. BRANCHLET OF SEQUOIA GIGANTEA, WITH CONE.

Sequoia—*continued.*

S. g. aurea (golden). This differs from the type only in the golden or yellowish colour of some of the smaller twigs. It is a pretty form when in good condition.

S. g. pendula (pendulous).* Branches numerous, deflexed from their base, drooping regularly one over the other, so as to produce an elegant, compact, conical plant. 1871.

S. sempervirens (evergreen).* Californian Evergreen Redwood. *fl.*, males globular, solitary at the tips of the branchlets, on slender footstalks, thickly covered with small, scale-like leaves. *l.* on the lateral branches and branchlets linear, blunt, two-rowed, flat, alternate, straight, rarely falcate, shining, ¼in. to 1in. long; those on the main branches and terminal points of the flower-bearing branchlets very short, narrow, sharp-pointed, or scale-like, imbricated or closely spiral. *cones* solitary, terminal, globular or egg-shaped, 1in. long; scales cuneiform. Branches horizontally spreading, irregularly scattered alternately along the stem; branchlets very numerous, in two rows, frequently drooping. The leaves turn purplish-brown in winter.

S. s. albo-spica (white-spiked). A form in which the tips of the young shoots are of a creamy-white colour.

S. s. glauca (glaucous). *l.* linear, acute, ¼in. long, of a fine glaucous-blue tint, particularly below, either loosely imbricated or openly disposed round the branches. Branchlets very much narrower and slenderer than in the type.

FIG. 478. FRUITING BRANCHLET OF SEQUOIA SEMPERVIRENS TAXIFOLIA.

S. s. taxifolia (Yew-leaved). This variety only differs from the type in having somewhat broader leaves. See Fig. 478.

SERANGIUM. A synonym of **Monstera** (which *see*).

SERAPHYTA (from *ser*, a silkworm, and *phyton*, a plant; in allusion to some fancied resemblance between the flower and the silkworm). ORD. *Orchideæ*. A monotypic genus. The species is a stove, epiphytal Orchid, formerly included under **Epidendrum** (which *see* for culture).

S. diffusa (diffuse). *fl.* greenish-white, rather small, loosely racemose, pedicellate, forming a terminal panicle; sepals and petals equal, spreading; lip undivided, broadly cordate, the claw as long as the column. April. *l.* coriaceous, oblong or rather broad; sheaths closely appressed. Stem leafy, sheathing, and scarcely fleshy at base. *h.* 1ft. to 2ft. West Indies, 1816. SYN. *Epidendrum diffusum* (B. M. 3565; L. B. C. 846).

SERAPIAS (the old Greek name given by Dioscorides to one of the Orchids, and derived from the Egyptian deity Serapis). SYN. *Helleborine*. ORD. *Orchideæ*. A small genus (four or five species) of hardy, terrestrial Orchids, natives of the Mediterranean region,

Serapias—*continued*

one extending as far as the Azores. Flowers often rather large, few in a spike; sepals erect, connivent or coherent in a tube; petals sometimes smaller, sometimes scarcely shorter, but much narrower; lip three-lobed, the lateral lobes erect, the middle one tongue-shaped and pendulous. Leaves narrow. Tubers undivided. In habit the species much resemble those of **Orchis** (which *see* for culture).

S. cordigera (heart-bearing).* Heart-flowered Orchis. *fl.* brown and lavender; lateral segments of the lip obtuse, erect, connivent; middle one longer, ovate, often cordate at base, acuminate, the disk pilose, the basilar callus deeply bilobed; bracts often longer than the flowers; spike at first crowded. *h.* 1ft South Europe, 1806. (A. B. R. 475; B. M. 5868A; S. F. G. 932.)

S. Lingua (tongue-lipped). Tongue-flowered Orchis. *fl.* reddish-brown; lateral segments of the lip ovate, obtuse; middle one longer and narrower, oblong-lanceolate, acuminate; basilar callus obscure, sulcate or flat; bracts shorter than the flowers; spike at first loose. *h.* 1ft. South Europe, 1786. (B. M. 5868B; H. E. F. 111; L. B. C. 655; S. F. G. 931.) The variety *luteola* has yellowish and purplish flowers.

S. papilionacea-lingua (a natural hybrid between *Orchis papilionacea* and *S. Lingua*). *fl.* five or six to a spike; sepals and petals pale green and pale purple, veined; petals erect, free, broad, spreading, and recurved; lip bright purple, large, broadly cordate, the margins crenulate, the base with two tubercles on the very short claw. *l.* narrow-lanceolate, acuminate, pale green, unspotted. Stem 1ft. or more high. South of France, 1876. (B. M. 6255.)

SERENOA (named in honour of Sereno Watson, a distinguished North American botanist). ORD. *Palmæ*. A monotypic genus. The species is a handsome, greenhouse, dwarf, unarmed, tufted Palm, closely allied to **Sabal** (which *see* for culture).

S. serrulata (serrulated).* Saw Palmetto. *fl.*, petals scarcely united; style slender; spadix densely tomentose, much shorter than the leaves. June. *fr.* black, eight to nine lines long. *l.* 2ft. to 4ft. high, circular in outline, fan-shaped, bright green; divisions fifteen to thirty, erect, slightly cleft at the apex, and without thread-like filaments in the sinuses; petioles plano-convex, slender, more or less spiny-edged, longer than the leaves. Stem 4ft. to 8ft. long, creeping, branching. Southern United States, 1840. SYN. *Sabal serrulata*.

SERIAL, SERIATE. Disposed in rows or series.

SERIANA. A synonym of **Serjania** (which *see*).

SERICEOUS. Silky; covered with closely-pressed, soft, straight pubescence.

SERICOCARPUS (from *serikos*, silken, and *karpos*, a fruit; alluding to the silky hairs on the achenes). White-topped Aster. ORD. *Compositæ*. A genus comprising five species of hardy, erect, perennial herbs, natives of North America. Flower-heads mediocre or small, corymbose or paniculate; involucral bracts rather broad, in many series; ray florets white; disk pale yellow, rarely changing to purplish; achenes silky-pilose; pappus bristles copious. Leaves alternate, sessile, entire or serrated. For culture of the under-mentioned species, *see* **Aster** (under which they are erroneously classed in some garden works).

S. conyzoides (Conyza-like). Silk Fruit. *fl.-heads* sometimes solitary and pedicellate, but usually sessile in small clusters; involucre somewhat turbinate; pappus ferruginous. June to August. *l.* ciliated, glabrous beneath, veiny, rather firm, 1in. to 3in. long. *h.* 1ft. to 2ft. 1778.

S. solidagineus (Solidago-like). *fl.-heads* small, glomerate at the extremities of the fastigiate peduncles; involucre cylindrical; pappus white. July to September. *l.* linear-oblanceolate or linear, obtuse, tapering to the base, entire, with serrulate-scabrous margins, obscurely dotted. *h.* 2ft. 1699.

SERICOGRAPHIS. Included under **Jacobinia** (which *see*).

SERINGIA (named in honour of Nicholas Charles Seringe, 1776-1858, Professor and Director of the Botanical Gardens at Lyons). SYN. *Gaya*. ORD. *Sterculiaceæ*. A monotypic genus. The species is an interesting, greenhouse, evergreen shrub, somewhat resembling a Commersonia in habit. A compost of sand, loam, and peat is most suitable to its culture. Propagation may

Seringia—*continued*.

be effected by young cuttings, inserted in similar soil, under a glass; or by seeds.

S. platyphylla (broad-leaved). *fl.* white, disposed in dense, terminal or leaf-opposed cymes, which are much shorter than the leaves; calyx about ¼in. long; petals none; stamens five, alternating with the calyx lobes. June. *l.* ovate to ovate-lanceolate, acuminate, coarsely toothed, 3in. to 4in. or even 5in. long, often oblique at base, glabrous or sprinkled with minute, stellate hairs above, densely tomentose beneath. Branches loosely whitish- or rusty-tomentose. *h.* 10ft. Australia, 1822.

SERINGIA (of Sprengel). A synonym of **Ptelidium** (which *see*).

SERIPHIUM. Included under **Stœbe** (which *see*).

SERISSA (a name altered from the old Greek *Seris*, used by Dioscorides). SYNS. *Democritea*, *Dysoda*. ORD. *Rubiaceæ*. A monotypic genus. The species is a pretty, greenhouse, branched shrub, highly glabrous or with puberulous branchlets, the bark fœtid. It succeeds best in a mixture of loam, peat, and sand. Propagation may be effected by cuttings, inserted in sand, under a glass, in heat.

S. fœtida (stinking). *fl.* white, axillary or terminal, solitary or fascicled; calyx tube obconical, the limb four to six-parted, persistent; corolla funnel-shaped, pilose within the throat, the limb of four to six short, obtusely three-lobed, erecto-patent lobes. Summer. *l.* rather small, opposite, sub-sessile, often fascicled on shortened branchlets, sub-coriaceous, ovate, acuminate, nerved. *h.* 2ft. India, China, Japan, &c., 1787. (B. M. 361, under name of *Lycium japonicum*.) There is a variety with double flowers (a rare occurrence in this order), and another with gold-margined leaves (I. H. ser. i. 369).

SERJANIA (named in honour of Paul Serjeant, a French friar and botanist). SYN. *Seriana*. ORD. *Sapindaceæ*. A large genus (about sixty species) of stove, climbing or twining shrubs, all natives of tropical and sub-tropical South America. Flowers yellowish; sepals five (or four and two of them connate), imbricated, concave; petals four; racemes or panicles axillary, often bearing two tendrils. Leaves alternate, exstipulate (or with minute stipules), ternate, biternate, or impari-pinnate, often pellucid-dotted. A few of the species have been introduced, but they boast of no particular beauty, and are probably only cultivated in botanical gardens.

SERPENT CUCUMBER. *See* **Trichosanthes anguina.**

SERPENT WITHE. *See* **Aristolochia odoratissima.**

SERPENT-WOOD. *See* **Rauwolfia serpentina.**

SERPICULA (from *serpo*, to creep; alluding to the habit of the species). SYN. *Laurembergia*. ORD. *Halorageæ*. A genus comprising from two to four species of small, greenhouse, decumbent or creeping, branched herbs, inhabiting marshes in the warmer parts of Asia, Africa, and America. Flowers minute, usually fasciculate. Leaves opposite and alternate, sub-sessile, linear or lanceolate, entire or toothed. *S. repens*, a native of South Africa, the only species introduced, is now probably lost to cultivation.

SERPYLLOPSIS. Included under *Trichomanes*.

SERRATE, SERRATED. Beset with antrorse teeth.

SERRATULA (from *serrula*, a little saw; alluding to the serrated foliage). Saw-wort. ORD. *Compositæ*. A genus comprising about thirty species of hardy, perennial herbs, natives of Europe, North Africa, and Asia. Flower-heads purplish, violet, or rarely white, solitary or corymbose; involucral bracts many, imbricated, the outer ones shorter, the inner ones more or less scarious at the tips; receptacle densely bristly; florets regular, five-lobed; pappus hairs many-seriate, coloured. Leaves alternate, toothed or lyrate-pinnatifid. The genus is represented in Britain by *S. tinctoria*, the herbage of which

Serratula—*continued.*

yields a yellow dye. None of the species are very ornamental, the only one calling for description being *S. quinquefolia*. This thrives in any common soil, and may be increased by seeds, or by divisions. Several species erroneously included here by garden authorities are now placed under **Jurinea, Liatris,** &c.

S. quinquefolia (five-leaved). *fl.-heads* intense purple; involucral scales ovate, shortly mucronate, appressed, the inner ones elongated and scarious. July. *l.* slightly glabrous, impari-pinnatipartite; lobes sub-bigugate, confluent, ovate-lanceolate, toothed, the terminal one large. *h.* 3ft. Caucasus, 1804. (B. M. 1871.)

SERRULATE, SERRULATED. Serrate, with very small or fine teeth.

SERRURIA (named in honour of Dr. James Serrurier, Professor of Botany at Utrecht). ORD. *Proteaceæ*. A genus comprising about fifty-two species of desirable, greenhouse, densely leafy shrubs, confined to South Africa. Flowers solitary under the bracts, sessile, densely capitate, sub-regular; perianth narrow, often incurved, the limb ovoid or oblong, the segments cohering towards the base; hypogynous scales four, linear or filiform. Leaves scattered, very narrow, trifid, pinnatifid, or dissected, rarely undivided. A selection of the species known in gardens is given below. They require precisely similar treatment to **Protea** (which *see*).

S. abrotanifolia (Abrotanum-leaved). *fl.* pink, the segments shortly bearded; stigma black; heads sessile, nearly as large as a walnut. July. *l.* 1in. to 1½in. long, slender, biternate, bipinnatifid above the middle, pilose. Branches glabrous. *h.* 3ft. 1803. SYN. *Protea abrotanifolia hirta* (A. B. R. 522).

S. arenaria (sand-loving). *fl.* purple, five lines long; heads longer than the tomentose peduncles, globose, about the size of a cherry. July. *l.* clustered, often secund, about 2in. long, slender, pinnate or trifid, the adults glabrous. Branches slender, simple. *h.* 1ft. 1803. Shrub erect or decumbent.

S. Burmanni (Burmann's). *fl.* purple, three to four lines long, clothed with dense, whitish or yellowish pubescence; partial peduncles shorter than the globose, many-flowered heads; corymb much-branched, rather shorter than the leaves. July. *l.* 1½in. long, slender, bipinnate; young ones clothed with short, cano-sericeous, adpressed pubescence, rarely spreading. *h.* 2½ft. 1786. Shrub erect, much-branched.

S. elongata (lengthened). *fl.* purple, minutely pubescent; bracts reddish-fuscous, ¼in. long; heads as large as a cherry, sixteen to twenty-flowered; peduncle 3in. to 10in. long, leafless, remotely bracteate; partial ones ½in. to 1½in. long, few-bracted. July. *l.* 3in. to 4in. long, digitate, slightly wrinkled, obsoletely sulcate, and, as well as the erect branches, glabrous. *h.* 1½ft. to 2ft. 1810.

S. emarginata (emarginate). *fl.* pink, small, the segments slightly pilose; bracts lanceolate, acute, pink at apex; heads terminal and springing from the upper axils, simple, as large as a cherry. July. *l.* clustered, about 1in. long, slender, acute, bipinnatifid above the middle (or biternate), pubescent. *h.* 2ft. 1800. SYN. *Protea abrotanifolia minor* (A. B. R. 536).

S. florida (flowery). *fl.* purple, five to six lines long, the lamina bearded with golden-fulvous silk; heads in imbricating bracts, seven to nine lines long, approximate-corymbose, globose or ovoid, longer than the bracteate peduncle. July. *l.* spreading, 2in. to 3in. long, all pinnate or bipinnate, slender; young ones slightly pilose; adults (as well as the ascending branches) glabrous. Stem corymbosely branched. *h.* 2ft. 1824.

S. glaberrima (highly glabrous). *fl.* purple, very glabrous, or the young ones having a silky tube; heads as large as a cherry, globose, or at length ovoid, axillary or terminal, few-flowered; peduncles about 1in. long, the axillary ones slightly nodding, the terminal ones erect. July. *l.* remote, acute, erecto-patent, trifid or rarely pinnately five-cleft or sub-pinnatifid; upper ones undivided. Stem 1ft. or more long, prostrate, very slender. 1825. Adult plant highly glabrous.

S. millefolia (Milfoil-like). *fl.* purple; bracts glabrous at the apex; stigma truncate; peduncles equalling, or longer than, the simple heads. July. *l.* bipinnatifid from the base, pilose. *h.* 4ft. 1803. SYN. *Protea triternata* (A. B. R. 337).

S. nitida (shining). *fl.* purple, with very narrow claws; bracts nearly equalling the flowers, the outer ones glabrous, the inner ones very silky-villous; heads twice as long as the peduncles. July. *l.* nearly 1½in. long, pinnatifid or nearly bipinnatifid, slender, and, as well as the branches, highly glabrous. *h.* 2ft. 1823.

S. Niveni (Niven's). *fl.* purple, densely bearded; bracts lanceolate; heads sub-sessile, as large as a cherry. July. *l.* spreading, nearly 1in. long, bipinnatifid, channelled within, very acutely mucronate, and, as well as the branches, highly glabrous. *h.* 9in. 1800. Plant decumbent, much-branched. SYN. *Protea decumbens* (A. B. R. 349).

Serruria—*continued.*

S. odorata (odorous). *fl.* pink, odorous, the outer ones at length reflexed-spreading; heads simple, terminal. July. *l.* bipinnatifid-filiform, acute, pilose. Sterile branchlets corymbose, exceeding the heads. *h.* 2ft. 1803. SYN. *Protea abrotanifolia odorata* (A. B. R. 545).

S. pedunculata (long-pedunculate). *fl.* purple, densely pubescent, slender, incurved; heads as large as a walnut or prune, solitary or corymbose; peduncles 1½in. to 3in. long, fulvous-tomentose. July. *l.* clustered, 1½ft. to 2ft. long, shortly pubescent, bi- or tripinnate nearly to the base. Branchlets often umbellate. *h.* 7ft. 1789. SYN. *Protea glomerata* (A. B. R. 264).

S. phylicoides (Phylica-like). *fl.* purple, the claw highly glabrous, the lamina snowy-bearded; heads as large as a hazel nut; peduncles sub-corymbose, longer than the heads. July. *l.* spreading, 1½in. to 2in. long, once-sulcate above, bipinnatifid or pinnatifid, glabrous; segments ½in. to 1in. long, undivided or rarely bifid, rather obtuse. Branches twiggy, loose, leafy. *h.* 3ft. 1789. SYN. *Protea abrotanifolia* (A. B. R. 507).

S. pinnata (pinnate). *fl.* pink, sometimes sub-arcuate, clothed with shortly appressed, whitish pubescence; heads globose, as large as a walnut, with villous-tomentose scales; peduncles ½in. to 1in. long. July. *l.* erect, 1in. to 1½in. long, slender, once-sulcate above, pinnately three to five-cleft, semi-terete, spreading-pilose, at length glabrous. Branches elongated, loosely leafy. 1803. Shrub prostrate. (A. B. R. 512.)

S. Roxburghii (Roxburgh's). *fl.* white, four to five lines long, loosely and adpressedly villous; heads ranging in size between a hazel nut and a plum, fulvous-villous. July. *l.* spreading, five to seven lines long, flabelliform, bipinnate, semi-trifid; segments divaricate, two or three-cleft or pinnatifid, minutely mucronulate. *h.* 3ft. to 4ft. 1806.

S. rubricaulis (red-stemmed). *fl.* purple, adpressedly silky-villous; bracts scarious; partial heads few-flowered; common peduncle shorter than the head, glabrous. July. *l.* erect, 1in. to 1½in. long, bipinnate or sub-pinnate, nearly glabrous. Branches straight, reddish, glabrous or slightly spreading-pilose. *h.* 2ft. 1818.

S. triternata (triternate). *fl.* purple, four to five lines long, densely pubescent; heads globose, as large as a cherry, densely many-flowered, at length slightly recurved; partial peduncles 1in. to 2in. long. July. *l.* spreading, 3in. to 5in. long, triternate or bipinnate, and, as well as the branches, glabrous; segments half spreading, ½in. to 1½in. long. Branches twiggy. *h.* 7ft. 1802. SYN. *Protea argentiflora* (A. B. R. 447).

S. villosa (villous). *fl.* purple, four to five lines long; heads as large as a cherry or a walnut, sessile, or sometimes very shortly pedunculate. July. *l.* spreading, nearly 1in., rarely 1½in., long, sub-biternate, at length glabrous; segments slightly diverging, with a slender, incurved or rarely straight mucro. Branches umbellate, straight. *h.* 2ft. or more. 1829.

SERSALISIA (in part). A synonym of **Lucuma** (which *see*).

SERTIFERA (from *sertum*, a garland, and *fero*, I bear; in allusion to the form of inflorescence). ORD. *Orchideæ*. A monotypic genus. The species is a stove, terrestrial orchid, having rather small flowers borne on rather long pedicels in short racemes, sessile, plicate-veined leaves, and a creeping rhizome. It is a native of Ecuador, but is not yet grown in gardens.

SERVICE BERRY. A common name for the fruit of *Amelanchier canadensis*.

SERVICE-TREE. *See* **Pyrus domestica.** The name is also applied to several other species.

SESAME. *See* **Sesamum indicum.**

SESAMUM (from *Sesamon*, the old Greek name used by Hippocrates). ORD. *Pedalineæ*. A genus comprising nine or ten species of stove, erect or prostrate herbs, all natives of tropical or South Africa. Flowers pale or violet, solitary in the axils, shortly pedicellate; calyx rather small, five-parted; corolla tube decurved; limb sub-bilabiate, the lobes five, somewhat spreading; stamens four. Capsules oblong or ovoid, two-celled, each cell containing numerous oily seeds. Lowest leaves opposite; uppermost ones, or nearly all, alternate, petiolate, entire, cut-toothed, trifid, or pedatisect. *S. indicum*, the only species in cultivation, is extensively grown in tropical countries for the oil contained in its seeds, which is sometimes called Gingelly Oil. For culture, *see* **Martynia.**

Sesamum—*continued.*

S. indicum (Indian). Gingelly or Gingilie Oil-plant; Sesame or Oily Grain, &c. *fl.*, sepals ¼in. long; corolla whitish, or with red, purplish, or yellow marks; pedicels solitary, rarely in twos or threes. July. *fr.* 1in. by ¼in., erect, two, or ultimately four-valved. *l.* oblong or ovate, 3in. to 5in. long, variable; upper ones often narrowly oblong and nearly entire; middle ones ovate and toothed; lower ones lobed or pedatisect. *h.* 1ft. to 2ft. India, &c., 1731. See Fig. 479. (B. M. 1688; B. M. Pl. 198.) SYNS. *S. luteum, S. orientale* (B. H. ix. 27).

S. luteum (yellow). A synonym of *S. indicum.*

S. orientale (Eastern). A synonym of *S. indicum.*

Sesbania—*continued.*

S. macrocarpa (large-fruited). *fl.* yellow and red, dotted with purple; racemes shorter than the leaves, one to four-flowered. August and September. Pods 8in. to 12in. long, pendulous, many-seeded. *l.*, leaflets oblong-linear, obtuse, mucronate. *h.* 3ft. Florida, Mexico, 1820. Greenhouse annual.

S. picta (painted). *fl.* yellow, the standard variegated with black, dotted lines; racemes many-flowered, nodding. July and August. *l.* with twelve to sixteen pairs of oblong-linear, obtuse leaflets. *h.* 4ft. to 6ft. New Spain, 1823. Stove biennial. (B. R. 873.)

S. platycarpa (flat-fruited). A synonym of *S. vesicaria.*

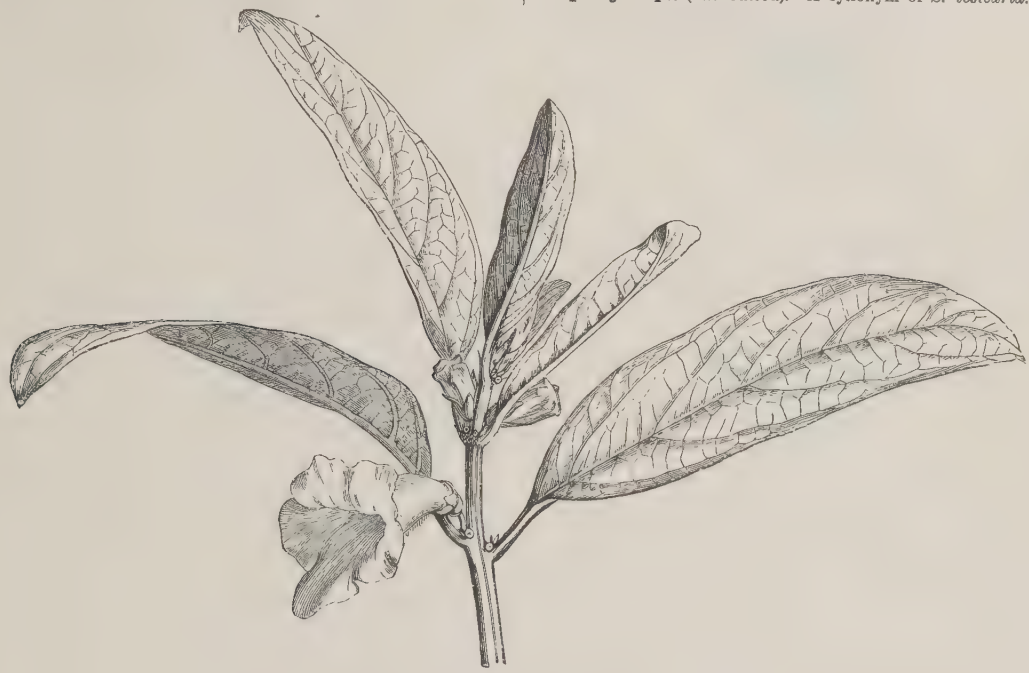


FIG. 479. UPPER PORTION OF PLANT OF SESAMUM INDICUM.

SESBAN. *See* **Sesbania ægyptiaca.**

SESBANIA (from *Sesban*, the Arabic name of *S. ægyptiaca*). Pea-tree. Including *Agati* (inadvertently kept distinct in vol. i.), *Daubentonia*, and *Glottidium.* ORD. *Leguminosæ.* A genus comprising about sixteen species of stove or greenhouse herbs or shrubs, sometimes arborescent, inhabiting the warmer regions. Flowers yellow, dull scarlet, purple, variegated, or white, on slender pedicels; calyx broad; standard orbicular or ovate, spreading or reflexed, the wings falcate-oblong, the keel incurved; bracts and bracteoles bristly; racemes axillary, lax. Pods linear or rarely oblong, compressed. Leaves abruptly pinnate; leaflets many-jugate, entire; stipules highly caducous; stipels minute or absent. The species best known to cultivation are described below. All thrive in a compost of loam and sandy peat. The annuals may be increased by seeds; the shrubby kinds by cuttings of the half-ripened, stubby shoots, inserted in sand, under a bell glass, in heat.

S. ægyptiaca (Egyptian). Sesban. *fl.* yellow; standard roundish and without dots. July and August. *l.*, leaflets ten pairs, oblong-linear, obtuse, and rather mucronate. *h.* 5ft. Egypt, &c., 1680. Stove shrub.

S. grandiflora (large-flowered). *fl.* rose-red, white, or rusty-yellow, large; standard oval-oblong, shorter than the wings; racemes few-flowered. July and August. Pods 1½ft. long. *l.* consisting of many pairs of glabrous leaflets. *h.* 14ft. to 25ft. East Indies, 1768. Stove tree.

S. longifolia (long-leaved). *fl.* yellow; racemes a little shorter than the leaves. June to August. *l.* having eleven or twelve pairs of lanceolate, acute leaflets. *h.* 6ft. New Spain, 1820. Stove shrub.

S. punicea (red). *fl.* vermilion, in racemes. July. *l.* like those of the false Acacia. *h.* 3ft. Texas, 1820. A common plant in various parts of Panda Oriental and Rio Grande, where it grows into a large, handsome shrub. Stove. SYN. *Daubentonia punicea.*

S. vesicaria (bladdery). *fl.* yellow, few, loose; standard reniform, very short and broad; racemes axillary, pedunculate. July and August. *l.*, primordial ones ovate, simple, the rest abruptly pinnate, many-jugate. *h.* 5ft. to 7ft. Florida and Carolina, 1816. Greenhouse annual. SYNS. *S. platycarpa, Glottidium floridanum.*

SESELI (old Greek name, used by Hippocrates, for an umbelliferous plant). Meadow Saxifrage. Including *Bubon, Libanotis*, and *Wallrothia* (of Sprengel). ORD. *Umbelliferæ.* A genus of about forty species of mostly hardy, perennial or rarely biennial, erect herbs, nearly all inhabiting the North temperate regions. Flowers white, in compound umbels; petals rather broad; involucral bracts numerous, few, or absent. Leaves ternate-pinnate, dissected or decompound; segments sometimes filiform, sometimes broader and incised. *S. dichotomum* and *S. gummiferum* are the only species calling for description here. *S. Libanotis* is a native of Britain. The plants thrive in ordinary soil, and may be increased by seeds.

S. dichotomum (dichotomous). *fl.* white; involucre wanting. June and July. *l.* pinnate; leaflets multifid, the segments linear. Stem terete, erect, clothed with fine down; lower branches short. *h.* 1ft. to 2ft. Tauria, 1818. Perennial. (B. M. 2073.)

S. gummiferum (gum-bearing). *fl.* white, tinged with pink; involucre of few leaflets, rarely wanting; umbel twenty-rayed. July to September. *l.* tripinnate, glaucous; leaflets cuneate, trifid. Stem thick, stiff, branched at top, yielding a gum when cut. *h.* 3ft. to 4ft. Tauria, 1804. A showy biennial. (B. M. 2259.)

SESIA. A genus of Moths, generally called "Clear-wings," in reference to the absence of scales from the greater part of the surface of the wings, which are, consequently, nearly transparent. This, together with the length and narrowness of the wings, and the form and colouring of the bodies, gives the Moths a striking re-

FIG. 480. SESIA APIFORMIS.

semblance to insects of the widely-different groups of Bees, Wasps, and two-winged Flies. *S. apiformis*, one of the largest British species, is very like a hornet in general appearance (see Fig. 480), and is known as the Hornet

FIG. 481. SESIA VESPIFORMIS.

Clearwing. Others, *e.g.*, *S. vespiformis* (see Fig. 481) and *S. formicæformis*, are much like some of the smaller *Hymenoptera*; while others, *e.g.*, the Currant Clearwing (*S. tipuliformis*) closely resemble slender, two-winged Flies. These resemblances probably afford protection from enemies. The larvæ live in the branches, stems, or roots of various plants, boring into the wood or pith. They become pupæ in their tunnels. The more hurtful species are the following: Red-belted Clearwing (*S. myopæformis*)—the larvæ feed, often in large numbers, in the wood of Pear-trees; the moth is black, with a bright red belt round the middle of the abdomen.

FIG. 482. LARVA OF SESIA TIPULIFORMIS.

Currant Clearwing (*S. tipuliformis*) — the larvæ (see Fig. 482) are common in twigs of Currants; the moth is black, with two narrow, yellow lines on the back of

Sesia—*continued.*

the thorax, and three narrow, yellow belts round the body, and the wings are yellowish near the tip, with black veins. Red-tipped Clearwing (*S. formicæformis*)—the larvæ feed in Willow and Osier twigs; the moth is black, with a deep red belt round the abdomen, and a broad, red tip to each fore wing. Hornet Clearwing (*S. apiformis*)—the larvæ live in wood of Poplars, each feeding for two years; the moth is much like a hornet in size and colour, being marked with brown, orange, and yellow. Willow Hornet Clearwing (*S. bembeciformis*)—the larvæ live in twigs of Willows and Osiers; the moth is much like the last-named, but the head is brown, not yellow, and there are no yellow spots on the thorax.

Remedies are very difficult of application, because of the concealed mode of life of the larvæ. Of course, the moths ought to be captured, when they can be found, and this is most likely to be accomplished in the early morning, soon after they crawl out of the pupa cases, and while they are resting on the tree or twig. No remedial measures can be taken while the larvæ are in the wood; and when holes are visible the moths have escaped. Badly-infested trees should be cut down and burned, to destroy the larvæ. If twigs of Currants, Osiers, or other plants liable to attack, suddenly begin to droop, they should be cut off, and the larvæ therein destroyed.

SESLERIA (named in honour of Leonard Sesler, an Italian physician and botanist). ORD. *Gramineæ*. A genus comprising eight species of hardy, perennial, tufted grasses, natives of Europe and Western Asia. Spikelets two to six-flowered; panicle spike-formed, often short and bluish, or slightly silvery, sometimes elongated. Leaves flat or convolute-terete. The genus, which has no horticultural interest, is represented in the British Flora by *S. cærulea*, a plant growing from 6in. to 18in. high.

SESQUI. A prefix which, used in Latin compounds, signifies one and a-half; *e.g.*, Sesquipedalis, 1½ft.

SESSILE. Sitting close on the supporting body, without any stalk.

SESUVIUM (signification of name unknown, probably arbitrary). ORD. *Ficoideæ*. A small genus (about four species) of stove or greenhouse, erect or prostrate, branched, succulent herbs or sub-shrubs, scattered over tropical sea-shores. Flowers often flesh-coloured or purple, axillary, sessile or pedunculate, solitary, clustered, or rarely sub-cymose; calyx tube turbinate, the five lobes coloured within; petals absent; stamens five. Leaves opposite, slightly fleshy, linear or oblong; stipules none, or sometimes connate with the petiole in a stipulæform membrane. *S. Portulacastrum* and *S. repens* are both edible as potherbs, but have a rather salt taste. Two species, both greenhouse, decumbent perennials, call for description here. These thrive in any well-drained, sandy soil. Propagated freely by slightly dried cuttings, inserted in similar soil, under a glass. Water must be sparingly administered.

S. Portulacastrum (Portulacastrum). Sea Purslane; Samphire or Seaside Purslane of the West Indies. *fl.* pedicellate; calyx green outside, reddish within; stamens twenty-five to thirty. June and July. *l.* linear or lanceolate-oblong, flat. 1692. (A. B. R. 201, under name of *Aizoon canariense*.) The variety *sessile* has sessile flowers.

S. revolutifolium (revolute-leaved). *fl.* red and white, sessile; stamens very numerous; stigmas five or six. July and August. *l.* ovate-oblong, with revolute margins, rather glaucous, not deep green. Cuba. (B. M. 1701, under name of *S. Portulacastrum* var.)

SETA. A bristle or bristle-shaped body; a slender, straight prickle; a stiff hair.

SETARIA (from *seta*, a bristle; alluding to the involucre of bristles surrounding the spikelets). ORD. *Gramineæ*. A genus comprising about ten species of

Setaria—*continued.*

stove, greenhouse, or hardy annual, sometimes tall grasses, broadly dispersed over tropical and temperate regions. Spikelets ovate, articulated with the pedicels in a dense, cylindric, terminal panicle, as in *Panicum*, but awnless, and with stout, rough bristles at the base on one side. Leaves flat. The genus, which has no horticultural value, is represented in Britain by *S. viridis* (Bottle Grass; Green Fox-tail Grass) *S. verticillata* has become naturalised in cultivated fields.

SETHIA. Included under *Erythroxylon.*

SETIFORM. Bristle-like.

SETIGEROUS. Bristle-bearing.

SETOSE. Bristly; covered with stiff hairs.

SETTERWORT. A common name for *Helleborus fœtidus.*

SETULOSE. Slightly bristly.

SET WALL. An old name for Valerian (*Valeriana*).

SEVERINIA (named after M. A. Severino, 1580-1656, Lecturer on Anatomy at Naples). ORD. *Rutaceæ.* A monotypic genus, now included, by Bentham and Hooker, under *Atalantia.* The species is a very desirable, greenhouse, evergreen shrub, requiring culture similar to **Citrus** (which *see*).

S. buxifolia (Box leaved). *fl.* white, small, sub-sessile, solitary or disposed in small axillary glomerules; stamens ten, free. May. *l.* simple (one-foliolate), coriaceous, persistent, entire. *h.* 3ft. China.

SEVILLE ORANGE. *See* **Citrus vulgaris.**

SEWERZOWIA (named in honour of the Russian traveller who first collected the plant). ORD. *Leguminosæ.* A monotypic genus, which probably should be included under *Astragalus.* The species is a hardy annual, requiring ordinary culture.

S. turkestanica (Turkestan). *fl.* small, in few-flowered racemes, partly concealed between a pair of stoutly-fringed bracts. Summer. *l.* impari-pinnate; leaflets six to ten pairs, small, oblanceolate, retuse. *h.* 6in. Turkestan, 1883. (R. G. 1883, p. 250.)

SEX. This term, used in Latin compounds, signifies six; *e.g.*, Sexangular, six-angled; Sexpartite, six-parted.

SEYMERIA (named in honour of Henry Seymer, an English naturalist). SYN. *Afzelia* (of Gmelin). ORD. *Scrophularineæ.* A genus of mostly hardy, erect, branched, annual or perennial herbs; nine species are known, of which one is a native of Madagascar, and the rest are North American. Flowers yellow, in interrupted racemes or spikes; calyx campanulate, with five entire or denticulated lobes; corolla tube short and broad, the limb of five broad or oblong, spreading lobes; stamens four, sub-equal; pedicels solitary, ebracteolate. Leaves mostly opposite, cut-toothed or dissected; upper floral ones reduced to entire bracts. Two species have been introduced. Both are hardy, North American annuals, and are very pretty subjects when in flower. Seeds should be sown in a well-drained bed of rather light, rich soil.

S. pectinata (comb-like). *fl.*, calyx lobes linear; corolla hairy outside, especially in the bud. July. *l.* pinnately parted into rather few short or oblong-linear divisions, or the upper ones incisely few-toothed or entire. *h.* 1ft. 1820.

S. tenuifolia (slender-leaved). *fl.* on filiform pedicels; calyx lobes bristly; corolla ¼in. long. July. *l.* ½in. long, copiously once or twice pinnately parted. *h.* 2ft. to 4ft. 1730.

SEYMOURIA. Included under **Pelargonium** (which *see*).

SHAD-BUSH. A popular name for *Amelanchier canadensis.*

SHADDOCK. *See* **Citrus decumana.**

SHADING. Throughout the summer months, nearly all indoor plants are benefited by being protected from exposure to the direct rays of the sun, even if they do

Shading—*continued.*

not absolutely require Shading. Particularly is this remark applicable to stove and greenhouse plants, very few of which, unless they can be placed in the open air, are successfully grown without more or less shade under glass. As a rule, the Shading used should be sufficiently thin to allow light to pass through it, while preventing the sun's rays doing injury. A great variety of material, in various thicknesses, is procurable for Shading plants; the system of fixing thin blinds to rollers, which may be drawn up in dull weather, is one of the best. A permanent shading invariably weakens plants, because in dull weather they cannot get sufficient light. When rollers and blinds cannot be fixed because of the expense, or for other reasons, perhaps the best alternative is to thinly stipple the glass outside with whiting mixed with milk, or some oily substance, which will not readily wash off. If white should be objected to, the solution, before being applied, may be tinted with a substance known as Brunswick green; but, as Shading of this sort would be more or less permanent for a season, it should be put on very lightly. Cutting-boxes, hand-glasses, and small propagating-frames may readily be shaded with sheets of paper, which can be taken off at night and during dull weather.

SHAGGY. Pubescent with long, soft hairs.

SHAKING OR QUAKING GRASS. *See* **Briza media.**

SHALLON BUSH. A common name for *Gaultheria Shallon.*

SHALLOT (*Allium ascalonicum*). A hardy perennial, native of Palestine. It has been cultivated, from a very remote period, for the use of its bulbs for seasoning culinary preparations, and for pickling; the leaves are also sometimes eaten when they are young and green. Shallots may be readily propagated each year by dividing the bulbs or cloves, and planting them separately. Rich soil is desirable, but it should not be purposely manured for this crop if a piece of land is available which has been enriched during the previous year for something else. Single cloves should be planted, not deeply, in autumn or at the end of February, about 4in. or 6in. apart. The plants need but little attention through the summer beyond keeping the ground free from weeds. When the leaves turn yellow, about July, the bulbs may be pulled up, dried in the sun for a few days, and then stored for use, in a similar way to Onions, in any rather dry shed from which frost is merely excluded. There are two or three varieties of Shallot in cultivation. The true one has elongated bulbs, narrowed to a long point; it keeps well, and seldom runs to seed. A form or variety known as the Russian, or Large Red, has very large bulbs of a reddish-brown colour. The Jersey Shallot has larger and much rounder bulbs than the true variety; it does not keep so long, and the plants flower and produce seeds more frequently.

SHAMROCK. In some districts of Ireland, this name is applied to one or more species of Clover; in England, the Wood Sorrel is generally supposed to be the Shamrock.

SHAMROCK, INDIAN. *See* **Trillium.**

SHAMROCK PEA. *See* **Parochetus communis.**

SHARD-BORNE BEETLE. A name popularly applied to more than one of the large Beetles, whose habit it is to fly heavily along, and which are, therefore, rendered noticeable by their habits. The name is taken from the term *shard*, formerly employed to denote any hard, thin body, and therefore used for the hard wing-cases of Beetles, which, spread out in flight, help to bear the insects up in the air; hence, "Shard-borne."

Shard-borne Beetle—*continued.*

The Beetle to which the name is most frequently given is one known also by other names, such as Dor Beetle. Its scientific name is *Geotrupes stercorarius*, and signifies "Dung-loving Earth-digger," a name very well chosen, in

FIG. 483. SHARD-BORNE BEETLE.

allusion to the habits of the insect The Beetle (see Fig. 483) is usually about 1in. long, and is oblong and heavy in form. It is nearly black, or dark violet, or metallic-blue or green. The wing-cases are grooved lengthwise. The Beetles are abundant throughout Britain, flying heavily and clumsily in summer evenings, and often striking against people in their flight. The females are in search of dung of cattle or of other large animals. If dung is found, the Beetles burrow through it to the ground; and there they dig "tunnels," about 1ft. long, straight downwards. Into each tunnel they push a ball of dung, and lay an egg in the ball. The young grub is thus provided with dung as food; and in the tunnel it grows and becomes a pupa, and then a beetle, which emerges, and provides in like manner for its own progeny. All "Dung-Beetles" are harmless, if not actually useful in gardens, on account of their habits.

SHAREWORT. A common name for *Aster Tripolium.*

SHEARS. Double-bladed cutting instruments, various kinds of which are required in gardens, some for trimming hedges, others for clipping grass edgings, and others, again, for pruning. Hedge or hand Shears are in general use for cutting Holly or Yew Hedges, &c. Grass-edging Shears are provided with long handles, which workmen may use while standing in nearly an upright position: the form with a wheel attached for running along by the edge of the grass is not to be recommended in preference to the ordinary kind. Pruning Shears are made in several small sizes, for using with one hand to cut branches that are only of moderate dimensions; a form with strong handles about 3ft. long, sometimes called Parrot-bill Shears, is one of the most useful pruning instruments for cutting branches that are too large for severing with a knife or any other kind of Shears.

SHEATH. A part which is rolled round a stem or other body.

SHED. A covered building, either inclosed or constructed with one or both of the sides open. Sheds are always very convenient storehouses in gardens; as a rule, the covered space available for keeping things dry is far too limited. Tool Shed and Potting Shed, terms in frequent use, are self-explanatory. Open Sheds usually have a wall at one side only, with the roof at the other side resting on upright pillars. These afford accommodation for keeping wheel-barrows and various tools dry, and space for storing pots and potting soils, preparing manure for Mushroom-beds, &c.

SHEEP BERRY. *See* **Viburnum Lentago.**

SHEEP'S BEARD. *See* **Urospermum.**

SHEEP'S-BIT SCABIOUS. A common name for *Jasione montana.*

SHEET GLASS. For glazing horticultural structures, this is the Glass best adapted. It may be obtained in sheets of great dimensions, for cutting up into large or small panes, as desired. Sheet Glass is made in various

Sheet Glass—*continued.*

thicknesses, and its value is based on the number of ounces in weight which a square foot contains. Thus 21oz. Glass is more expensive than 16oz., as it contains the additional weight in each square foot of its surface, and is, consequently, thicker throughout. *See also* **Glass.**

SHELL-BARK HICKORY. *See* **Carya alba.**

SHELL-FLOWER. A popular name for several species of *Alpinia* and *Chelone*, and *Moluccella lævis.*

SHELTER. The value of Shelter cannot be overestimated in connection with the cultivation of somewhat tender trees and shrubs, fruit-trees, kitchen-garden crops, and flowers, and gardening generally. A site naturally sheltered is always preferable; but this is not always at command, and artificial methods of protection have to be resorted to. Especially is Shelter necessary from cold and unfavourable winds, and on the sea-coast from the prevailing winds and salt spray. Young trees and shrubs in nursery plantations may be effectually protected by planting hedges at right angles to each other, so as to form squares. These may be of Beech, Privet, Hornbeam, Thorn, Holly, or Yew, any one of which may be grown to the desired height, and kept trimmed. For sheltering valuable alpines and perennials that are not quite hardy, hand-glasses or bell-glasses are well adapted; a little dry litter or bracken may be scattered over them as well during severe frost. Small hurdles, placed on the coldest and most exposed sides, are good for protecting some of the larger specimens, also for placing over half-hardy shrubs and trees on walls. A covering of Frigidomo, or any woolly material, will afford a good deal of Shelter to plants in frames during winter, and this substance, or even ordinary netting, placed over wall-fruit trees, when in flower, will often secure a crop that would otherwise be lost. Branches of Common Spruce may be used with advantage for sheltering somewhat tender trees on walls, and for such plants as Tea Roses in beds, &c. For preserving specimen plants, such as shrubs, that are not hardy, some stakes may be tied together, so as to form a sort of hood, somewhat in the shape of an extinguisher, and covered close down to the bottom with ordinary garden mats. This may be lifted on and taken off in winter, according to the state of the weather, and will be found to provide ample Shelter to the plant beneath. The necessity of providing Shelter is referred to under **Garden** and **Seaside Grounds and Plants,** and in other places where the plants described are in need of a specially-favoured situation.

SHELVES. Boards of various widths, but generally about 1in. thick, used for standing plants upon in glass structures. They should be painted the same colour as the rafters and other parts of the woodwork. Shelves may either be movable or fixed to the framework of a stage, as in a greenhouse. A single Shelf along the back wall of a lean-to house, or suspended by irons from the roof, is often a valued place for growing small or medium-sized plants that need plenty of light.

SHEPHERDIA (named after J. Shepherd, curator of the Liverpool Botanic Garden, who died in 1836). SYN. *Leptargyreia.* ORD. *Elæagnaceæ.* A small genus (three species) of ornamental, hardy, deciduous shrubs or small trees, natives of North America. Flowers diœcious, small, very shortly spicate or racemose, opposite the small bracts at the sides of the rachis. Fruit-bearing perianth baccate and persistent at base. Leaves opposite, petiolate, oblong, entire. Two of the species have been introduced. They require similar culture to **Hippophae** (which *see*). *S. rotundifolia*, not yet introduced to cultivation, is a handsome shrub, peculiar to the mountains of Southern Utah.

S. argentea (silvery). Beef Suet-tree; Rabbit Berry. *fl.* yellow. April. *fr.* scarlet, edible, acid-flavoured. *l.* narrower than in

Shepherdia—*continued.*

S. canadensis, tapering at base, silvery on both sides. Tall shrub or small tree. 1820.

S. canadensis (Canadian). *fl.* yellowish, covered with rusty scales. May. *fr.* yellowish-red, insipid. *l.* elliptic or ovate, nearly naked and green above, beneath silvery-downy and scurfy with rusty scales. *h.* 3ft. to 6ft. 1759.

SHEPHERD'S CLUB. *See* **Verbascum Thapsus.**

SHEPHERD'S KNOT. A common name for *Potentilla Tormentilla.*

SHIELD-BUDDING. *See* **Budding.**

SHIELD FLOWER. The popular name for *Aspidistra.*

SHIELD-SHAPED. Round or oval and flat, with a stalk attached to the lower surface. *See* **Clypeate, Peltate,** and **Scutate.**

SHINGLE OAK. *See* **Quercus imbricaria.**

SHOEBLACK-PLANT, or **SHOE FLOWER.** A common name for *Hibiscus rosa-sinensis.*

SHOLA OR SOLAH PLANT. A common name for *Æschynomene aspera.*

SHOOTING STAR. A common name for *Dodecatheon Meadia.*

SHOT, INDIAN. *See* **Canna.**

SHOVELS. There are several sorts of these, all of which are found useful in gardens. Shovels are lighter than spades, and better adapted for shifting light soil, short, loose manure, sand, gravel, &c. Square-topped Shovels, having their two side edges slightly turned up, are most generally useful; those with a somewhat shield-shaped point are well adapted for shovelling gravel and stones. Stoke-hole Shovels should be made chiefly or entirely of iron, in order that they may withstand the heat to which they become subjected in stoking. The pan is best made long, and not very wide, as, when charged with coke, it may then be readily emptied into the furnace without coming into contact with the front, which is often very limited in width.

SHRIVELLING. A condition met with in immature fruit on plants growing in unfavourable conditions. The fruits, after being properly set, so far as can be judged from their appearance, begin to wither, and finally shrivel and fall off without ripening, so that the yield of fruit is frequently much lessened. The cause of this condition seems to be deficiency in the supply of water to the fruit, which usually shows no evidence of any disease due to parasitic Fungi or insects. Shrivelling is quite distinct from the fall of the fruit known as "Windfalls." This latter results from the presence in the fruit of insects, which eat the seeds and cause premature and imperfect ripening, with early separation from the plant. Such "Windfalls," on being cut open, will show clear traces of the cause of injury in the interior, round the seeds. The deficiency of water to which Shrivelling is ascribed may result from various causes: one of the most frequent is dryness of the soil or of the atmosphere, which causes evaporation from the green parts at a more rapid rate than that at which the roots can supply the fluid. Another cause of such deficiency is the luxuriant growth of leafy shoots on plants in sheltered, warm situations: evaporation goes on from them in excess of the power of the roots to supply the full amount needed by leaves and fruits. Poor soil and insufficient nourishment have been suggested as causes.

Remedies must be selected according to the cause, which must first be carefully sought out. If the soil is poor, manure should be supplied; if it is too dry, it must be watered. Any excess in green shoots must be pruned away. Ringing the fruiting branches—*i.e.*, the removal of a narrow ring of bark from their bases—has

Shrivelling—*continued.*

been found very useful in diminishing the loss by Shrivelling; it tends, besides, to improve the quality of the fruit, and hastens the period of ripening. It acts by preventing the passage downwards, through the bark, of the food formed in the leaves of the branch, so that all the food is retained for the nourishment of the products of the branch itself. This method is applicable only to Dicotyledons with a distinct bark; but these include all the fruit-bearing plants of the colder temperate regions. Some plants bear the operation well; but, in general, it should only be performed as a last resort, as the branches are apt to die above the ring, or to snap off at it, and the parts below the ring do not get enough nourishment, owing to the obstacle interposed by it to the descent of the elaborated sap. The roots, too, suffer if many branches are ringed, and the whole plant is thus weakened and may die from the effects. There is also danger of parasitic Fungi or insects obtaining entrance into the tissues before the wound produced by ringing the branch has been properly healed.

SHRUB. A low, woody-stemmed perennial.

SHRUBBERIES AND SHRUBS. The term Shrubbery is usually applied to a plantation of Shrubs, although many other plants not strictly of a shrubby nature may be intermixed. Shrubs are divided into two great classes, deciduous and evergreen; both are very largely represented in gardens, but, unfortunately, with some few exceptions, they do not generally receive the attention which they deserve. In the embellishment of flower-gardens and pleasure-grounds, Shrubs play a most important part; indeed, take these away, and more than half the beauty is gone. Some are best planted in large clumps by themselves — Rhododendrons, for instance — although such clumps may be associated with others where any kind of grouping is attempted, or an American garden laid out.

A point of great importance which, it is to be feared, is too often overlooked, is that Shrubs which have annually to perfect their wood for flowering—be they deciduous or evergreen—should not be planted under the shade of trees: they need an open situation, and plenty of light, if proper development is to be attained. There are some evergreen subjects that do well under trees, but they are extremely few compared with those which fail to thrive under such conditions. Forest-trees should not be admitted permanently into a Shrubbery: if planted there when young, it should be with a view to subsequent removal. Trees may, however, be utilised to form a background if they are sufficiently far away to prevent their roots from robbing the soil. Mixed Shrubberies are generally arranged and planted with a view to producing an effect throughout the summer; but by making a suitable selection, and arranging with judgment, they may be rendered attractive, either in flower or foliage, throughout the whole year. As a boundary or screen dividing cultivated from wild grounds, or as a background for a mixed border in flower-gardens, evergreen Shrubs are unsurpassed. American Shrubs, when they can be obtained in quantity, are best planted in beds by themselves, or plants of very dwarf stature may appropriately form an edging for others which do not exceed some 3ft. or 4ft. in height.

An endless variety of subjects, both evergreen and deciduous, may be accommodated in a mixed Shrubbery of only moderate extent, but the planting should only be entrusted to persons having a knowledge of the different habits and dimensions which are likely to be attained. For instance, the front line should be restricted to plants that habitually remain compact, and do not grow tall, while the back part may be filled with such specimens as are of the opposite description. The centre space will then accommodate others of medium stature, and the eye will gradually pass from front to back,

Shrubberies and Shrubs—*continued.*

while the habits of the various Shrubs employed will invariably prevent an undue formality. Overcrowding is especially to be avoided, but in planting a new Shrubbery, a large number of duplicates may be inserted, with a view of treating them as being in a nursery for a year or two, and then transplanting elsewhere as the permanent specimens require additional space. Constant attention is necessary in mixed Shrubberies, to prevent each plant, particularly if it be a strong-growing one, from overgrowing its neighbour. This is a matter too often overlooked or neglected, and the consequence is that a slower-growing, but, as a rule, much more valuable, plant is either destroyed or disfigured because of the rampant growth of something else in too close proximity, as, for example, variegated Aucuba, Box, common or Portugal Laurels, or Yew. It is much better to keep all of these out of a Shrubbery, or relegate them to some back position where they may be allowed to grow and thicken without injuring the more select occupants.

Ground intended for a Shrubbery should be well trenched or deeply dug over before planting is attempted; it is then an easy matter to make holes wherever they are required, and the soil, on being dug out again, will break up finer for intermixing amongst the roots. October is the best month for the general transplanting of Shrubs, but many evergreens may be safely moved with balls at almost any season from August until the following May, except during frosty or snowy weather. The roots should not be kept out of the ground longer than is really necessary; they are nearly always active, and soon suffer if exposed and allowed to get dry.

Summer Pruning of Shrubs. It has been already remarked that if Shrubs in a mixed Shrubbery are to be kept within bounds, and each individual prevented from overgrowing its neighbour, constant attention in the matter of pruning is necessary throughout the summer, or at least during the growing season. Summer pruning of Shrubs is, unfortunately, too sadly neglected, when so many things are providing employment, but its advantages are none the less important, as, where it can be attended to, the results show. Shrubs usually flower on the wood made the previous year, but not always; sometimes, the blossoms appear from midsummer until autumn on the young shoots. Some knowledge of the habits and mode of flowering which the various kinds assume is therefore necessary, in order that pruning may be carried out at the proper time, and in the best manner. For instance, if a Shrub flowers naturally on wood of the previous year, and these growths are cut away in the autumn, or early the following spring, the embryo blossoms must be, as a matter of course, destroyed. Deutzias, Forsythias, Lilacs, the species of *Philadelphus*, Weigelas, and Viburnums, are examples of Shrubs such as those to which reference is made. The time to prune these, and many others of like habit, is in summer, immediately the flowers drop—that is, presuming it is attempted at all: some gardeners prefer letting such subjects grow at will, but this is scarcely allowable in the mixed Shrubbery. If the old shoots are removed as soon as the flowering is over, others will proceed from where these have been detached, and develop for the succeeding year, and the plant will not be materially enlarged in comparison with an unpruned specimen. Rhododendrons and hardy Azaleas, if they need pruning or cutting back, should receive it at a similar period—namely, as soon as the flowers fade. Many ornamental evergreen Shrubs, grown principally for their foliage, may frequently be improved by summer pruning, carried out more or less extensively, according to the position the plants occupy, and the purpose for which they are grown.

All Shrub pruning and cutting should be executed, whenever possible, with a knife, or one of the different

Shrubberies and Shrubs—*continued.*

instruments procurable for the purpose: the work may then be performed without cutting the foliage, or otherwise injuring the branches that are left. Clipping with shears is most objectionable, excepting when the Shrubs are planted as a hedge, a purpose for which Box, Holly, Privet, and Yew, are extensively employed.

SHRUBBY PINK. *See* **Dianthus fruticosus.**

SHUTEREIA. *See* **Palmia bicolor.** *Hewittia bicolor* is now the correct name of this plant.

SIBBALDIA. Included under **Potentilla** (which *see*).

SIBERIAN CRAB. *See* **Pyrus prunifolia.**

SIBERIAN PEA-TREE. *See* **Caragana.**

SIBTHORPIA (named after John Sibthorp, 1758-1796, Professor of Botany at Oxford, and the originator of "Flora Græca"). SYN. *Disandra.* Including *Hornemannia.* ORD. *Scrophularineæ.* A genus consisting of half-a-dozen species of greenhouse or hardy, prostrate, hairy herbs, often rooting at the nodes; they are natives of Western Europe, tropical and North-western Africa, Nepaul, and South America. Flowers yellow, yellowish-pink, or red, on axillary, solitary or fascicled pedicels; calyx campanulate, four to eight-cleft (often five-cleft); corolla tube short, sub-rotate; lobes of limb as many as, or one more than, the calyx lobes, spreading; stamens as many as, or one less than, the corolla lobes. Leaves alternate or fascicled, petiolate, orbicular-reniform and deeply crenate or incised-toothed. *S. europæa* (Cornish Moneywort, Pennyleaf, or Pennywort), comprised in the British Flora, is more curious than beautiful; but the variegated form is a pretty plant, well worth cultivating. The latter requires a light, well-drained soil, and should be grown in a cold frame or cool greenhouse, under a glass. Only one species—*S. peregrina*—calls for description here. It is a small, trailing, hairy, greenhouse perennial. When raised, its pendent branches and little, yellow flowers assume a very pretty appearrance. It will succeed in any light, rich soil. Propagation may be effected by divisions or by cuttings, with or without a glass, in any shady situation.

S. peregrina (foreign). *fl.* yellow, four to five lines in diameter, five to eight-parted; stamens slightly shorter than the corolla; peduncles often fascicled, 2in. long. June *l.* much crenated. Madeira, 1771. (B. M. 218, under name of *Disandra prostrata.*)

SICELIUM. A synonym of *Coccocypselum.*

SICKLEWORT. A common name for *Prunella vulgaris.*

SICYOCARPUS. A synonym of **Marsdenia** (which *see*).

SICYOS (an old Greek name, used by Theophrastus for the Cucumber; applied to this genus in allusion to the resemblance in, and affinity of, the species). ORD. *Cucurbitaceæ.* A genus comprising about a score species of half-hardy, climbing or prostrate, annual herbs, natives of the warmer parts of America, the Pacific Islands, and Australia. Flowers small or minute, monœcious. Fruit compressed or angular, rarely exceeding 1in. in length. Leaves angular or lobed, rarely profoundly three to five-lobed. Several of the species have been introduced, but they have no value as garden plants.

SIDA (an old Greek name, used by Theophrastus for the Water-Lily). Indian Mallow. ORD. *Malvaceæ.* A genus comprising about eighty species of stove, greenhouse, or hardy herbs, sub-shrubs or shrubs; about eight inhabit the warmer parts of Africa and Asia, thirteen are indigenous to Australia, and the rest are American. Flowers various-coloured and sometimes showy, sessile or pedunculate, solitary or glomerate, axillary or disposed in terminal heads, spikes, or racemes; calyx five-toothed or five-cleft; petals five, hypogynous; staminal column divided into numerous filaments at the apex; bracteoles absent, or distant from the calyx. Leaves alternate.

Sida—*continued.*

Only three species call for description here. They thrive in any rich soil. *S. Napæa* may be increased by seeds; and the others by cuttings, inserted in sand, under a glass, in heat. Many plants, formerly included here, are now classed under *Abutilon*.

S. inæqualis (oblique-leaved).* *fl.* on lateral peduncles about 2in. long; calyx segments ovate, acute, ferruginous, pubescent; corolla white, 2in. across when fully expanded, the petals clawed, densely glandular-pubescent outside. May. *l.* 4in. to 7in. long, slightly undulated, harshly pubescent, cordate-ovate, unequal at base, acuminate; petioles 1in. to 2in. long. *h.* 7ft. Brazil, 1829. Stove shrub. (B. M. 3436.)

S. Napæa (Napæa).* *fl.* white, large, disposed in umbellate corymbs; carpels ten, pointed. Summer. *l.* five-cleft; lobes oblong, pointed, toothed. *h.* 4ft. to 10ft. North America. A tall, smooth, hardy, herbaceous perennial. (B. M. 2913.)

S. sessiliflora (sessile-flowered). *fl.* yellow, small, somewhat glomerate, sessile, axillary and terminal; corolla scarcely twice the length of the calyx. August to November. *l.* cordate, acute, serrated. *h.* 3ft. South America, 1827. Stove sub-shrub. (B. M. 2857.)

SIDALCEA (from *Sida*, and *Alkea*, an ancient Greek name, used by Dioscorides for some *Malva*; alluding to the appearance and alliances of the plants). ORD. *Malvaceæ*. A genus comprising eight species of hardy, mostly perennial herbs, with the habit of *Malva* or *Althæa*, natives of Western North America. Flowers shortly pedicellate or sessile, disposed in terminal racemes or spikes; calyx five-cleft; petals rose-purple or white; staminal column duplex at apex. Leaves mostly lobed or parted. *S. candida* and *S. malvæflora*, perhaps the only species in cultivation, require culture similar to **Malva** (which *see*).

S. candida (white). *fl.* white, in terminal racemes, freely produced. Summer. *l.* roundish, seven-lobed, glossy, long-stalked. *h.* 2ft. to 3ft. Colorado, 1882.

S. malvæflora (Mallow-flowered). *fl.*, corolla lilac; racemes many-flowered; pedicels twice as long as the calyx. Summer. *l.*, radical ones orbicular, loosely five to nine-lobed or incised-crenate; primary ones sub-truncate at base; cauline ones profoundly seven to nine-cleft; segments trilobed, toothed at apex, the uppermost ones entire. Stem twiggy, slender. *h.* 1½ft. Texas, 1838. (B. R. 1036, under name of *Sida malvæflora*.) SYN. *Callirhoe spicata* (R. G. 737.)

SIDE-GRAFTING. A method of Grafting that may be adopted for supplying a branch or stem to a tree when one is deficient; it may be practised without cutting away the head of the stock. For mode of application, *see* **Grafting.**

SIDERITIS (an old Greek name, used by Dioscorides for several plants, and derived from *sideros*, iron; so named on account of a supposed property of healing flesh-wounds inflicted by iron). Ironwort. SYNS. *Burgsdorffia, Hesiodia, Marrubiastrum.* ORD. *Labiatæ*. A genus comprising about forty-five species of hardy or half-hardy, often woolly or softly pilose herbs, sub-shrubs, or shrubs, natives of the Mediterranean region and the Canary Islands, numerous in the Orient. Flowers often yellowish, small; calyx tubular, with five erect, usually somewhat spiny teeth; corolla tube included; limb bilabiate, the upper lip entire, emarginate, or bifid, the lower one trifid, its middle lobe much the largest; stamens four; whorls six to many-flowered, axillary or interruptedly or densely spicate. Nutlets ovoid, smooth. Leaves entire or toothed; floral ones reduced to bracts, or the lower cauline ones conformed. The species (a representative selection of which is given below) prefer a dry, sandy or chalky soil. Propagation may be effected by seeds, by cuttings, or by divisions. All have yellowish flowers, produced in summer.

S. canariensis (Canary Islands). *fl.*, corolla scarcely exceeding the calyx teeth, the upper lip emarginately bifid, the lower spreading; whorls twenty to thirty-flowered, sub-globose; racemes simple. *l.* ovate, crenate, cordate at base, 2in. to 4in. long, thick, wrinkled, velvety-woolly. *h.* several feet. Teneriffe, 1869. Greenhouse shrub. (Ref. B. 160.)

S. candicans (whitish). *fl.* sub-sessile; corolla scarcely exceeding the calyx; whorls usually ten-flowered, the lower ones distant; racemes simple. *l.* ovate, slightly crenate, truncately cordate at base, thick. *h.* 3ft. Teneriffe, 1714. Habit of

Sideritis—*continued.*

S. canariensis, but wholly clothed with white wool. Greenhouse shrub.

S. incana (hoary). *fl.*, calyx white-woolly; whorls distant, about six-flowered. *l.* sessile, oblong-linear, obtuse, entire, ½in. to 1½in. long, white-woolly; upper ones small, remote. Branches white-woolly or tomentose. *h.* 1ft. Spain, 1752. Half-hardy sub-shrub.

S. perfoliata (perfoliate-leaved). *fl.* sessile; corolla scarcely exceeding the calyx teeth; whorls all distinct, rather distant. *l.* half-amplexicaul, ovate-oblong or lanceolate, softly villous, 1½in. to 2in. long; floral ones broad, spreading. Branches erect, 1ft. to 1½ft. high. South Europe, 1731. Half-hardy sub-shrub.

S. scordioides (Scordium-like). *fl.*, corolla yellowish, the upper lip paler or white, slightly exceeding the calyx teeth; whorls interruptedly or densely spicate; spikes 1in. to 3in. long. *l.* ovate, oblong, or oblong-linear, narrowed at base, incised-toothed; floral ones very broad, spiny-toothed. *h.* 1ft. South Europe, 1597. Hardy sub-shrub.

S. s. alpina (alpine). *fl.* in densely or somewhat interruptedly spicate whorls. *l.* oblong-ovate, few-toothed, cano-villous or at length glabrous. Branches short, decumbent. Pyrenees, 1827.

S. s. angustifolia (narrow-leaved). *l.* oblong-linear, almost glabrous. Pyrenees, 1597.

S. s. elongata (elongated). *fl.* in interruptedly or rarely densely spicate whorls. *l.* oblong or oblong-lanceolate, incised-toothed, nearly glabrous. Branches elongated, ascending or erect. Spain, 1822.

S. taurica (Taurian). *fl.*, corolla slightly larger than the calyx. *l.* thick, oblong-lanceolate or spathulate, narrowed at base, the lower ones crenulate, densely white-woolly. *h.* 1½ft. Tauria, 1822. Hardy sub-shrub.

SIDERODENDRON. A synonym of **Ixora** (which *see*).

SIDEROXYLOIDES. A synonym of **Ixora** (which *see*).

SIDEROXYLON (from *sideros*, iron, and *xylon*, wood; alluding to the very hard wood furnished by the various species). SYNS. *Achras* and *Sapota* (as far as the Old World species are concerned), *Robertsia*. ORD. *Sapotaceæ*. A genus comprising nearly sixty species of stove or greenhouse, glabrous or pubescent trees or shrubs; they are broadly dispersed through the tropics, a few are found in the extra-tropical regions—South Africa, Australia, and New Zealand—and one in Madeira. Flowers usually small, sessile or pedicellate, fascicled at the nodes or axillary, five-parted; calyx segments closely imbricated; corolla broad or tubular-campanulate. Berries ovoid or globose. Leaves coriaceous, scattered. The fruits of *S. dulcificum* have a very sweet taste, and are known, with others, in West Africa, under the name of Miraculous Berry. Several of the species have been introduced, but they are of little or no value from a garden standpoint.

SIDE-SADDLE FLOWER. *See* **Sarracenia.**

SIEBERA (so called in honour of F. W. Sieber, of Prague, 1785-1844, a botanist who travelled in the East). SYN. *Trachymene* (of De Candolle). ORD. *Umbelliferæ*. A genus comprising fourteen species of greenhouse, rigid herbs with a perennial (almost woody) stock and virgate branches, or Heath-like shrubs, glabrous or slightly glandular-pubescent, all natives of Australia. Flowers white, small; calyx teeth small, but usually conspicuous; petals entire; involucral bracts small; umbels compound or rarely simple, terminal. Leaves all entire, or the lower ones divided or all reduced to small scales, without stipules. The under-mentioned species is, perhaps, the only representative of the genus which has been introduced to English gardens, and is probably not now in cultivation. For culture, *see* **Trachymene.**

S. Billardieri lanceolata (Billardière's, lanceolate-leaved). *fl.*, involucral bracts linear; umbels compound, sessile or pedunculed. *l.* lanceolate, acute, narrowed at the base, mostly above ¼in. long. 1829. A shrub, either low and diffuse or erect and attaining a height of 2ft. to 3ft. (B. M. 3334, under name of *Trachymene lanceolata*.)

SIEBERIA. A synonym of **Habenaria** (which *see*).

SIEGESBECKIA (named in honour of John George Siegesbeck, M.D., a German botanist). ORD. *Compositæ*. A genus consisting of only a couple of species of hardy,

Siegesbeckia—*continued.*

usually annual herbs; one (including several so-called species propounded by various authors) is broadly dispersed over tropical and sub-tropical regions; the other is a native of Peru. Flower-heads yellow or white, small, paniculate, sub-radiate; involucral bracts few, herbaceous; receptacle small; achenes glabrous. Leaves opposite, often broad, toothed. Only *S. orientalis* calls for description here. Seeds should be sown on a hot-bed, in spring, and the seedlings, when strong enough, planted in the open border, at the end of May.

S. orientalis (Eastern). *fl.-heads* yellow; outer involucral scales three or four times longer than the inner ones. August. *l.* ovate-triangular, cuneate at base, acuminate at apex, deeply toothed. *h.* 2ft. Tropics, widely dispersed, 1824. (B. R. 1061; S. B. F. G. 203, under name of *S. droseroides.*)

SIEVERSIA. Included under **Geum** (which *see*).

SIEVES. These are in frequent demand for sifting soils intended for potting, seed-sowing, &c., also for screening cinders and gravel. What may be termed a handy set, would be one of each with ¼in., ½in., ¾in., and 1in. wire meshes respectively. For covering very minute seeds a small-meshed Sieve should be used, but the ¼in. size is fine enough for the major portion of seeds, if it is properly and carefully handled. Sieves for cleaning dry, ripe seeds are specially made for that purpose in different sizes.

SIGILLARIA. A synonym of **Smilacina** (which *see*).

SIGMATOSTALYX (from *sigma*, *sigmatos*, S-shaped, and *stalix*, a stake). ORD. *Orchideæ.* A genus comprising about seven species of dwarf, stove Orchids, natives of tropical America. Flowers mediocre or rather small, shortly pedicellate, scattered, racemose; claw of the lip long, two-keeled; peduncles axillary under the one-leaved pseudo-bulbs. Few of the species are yet in cultivation. For culture, *see* **Oncidium.**

S. malleifera (hammer-bearing). *fl.* yellow, brown-spotted, developed at distant periods; sepals and petals ligulate-triangular, acute; lip three-parted, the divisions linear, emarginate; callus hammer-like; raceme slender. *l.* light green, cuneate-ligulate, 5in. long, ¾in. broad. Pseudo-bulbs dark brown, oblong, 1½in. long, ½in. broad. New Grenada, 1883.

S. radicans (rooting). *fl.* yellow, greenish, and violet-purple, in an elongated raceme; sepals and petals cuneate-oblong, acute; lamina of the lip transversely sagittate, one to three-lobulate; calli in one or two series. *l.* cuneate, linear-ligulate, acute, twin. Pseudo-bulbs oblong-ligulate. Rhizome radicant. Brazil.

SIGMOID. Somewhat resembling in form the letter S.

SILAUS (an old Latin name, used by Pliny to indicate some umbelliferous plant). ORD. *Umbelliferæ.* A genus comprising only a couple of species of hardy, perennial, glabrous herbs, found in Europe and Russian Asia. Flowers yellowish or greenish-yellow, in compound umbels; bracts two or none. Leaves pinnately decompound; segments slender. *S. pratensis* (Meadow or Pepper Saxifrage) is a British plant. The species are of no value from a garden standpoint.

SILENE (said to be derived from *sialon*, saliva; alluding to the viscid exudation on the stems and calyces of many of the species; the English name Catchfly alludes to the same peculiarity). Campion; Catchfly. ORD. *Caryophylleæ.* A very large genus (400 have been described as species, but, according to Bentham and Hooker, few more than 200 are entitled to specific rank) of greenhouse or hardy, erect, tufted, decumbent, or diffuse-climbing, annual, biennial, or perennial herbs; they are mostly natives of South Europe, North Africa, and extra-tropical Asia, about a dozen are South African, scarcely eighteen are found in North America, and eight are included in the British Flora. Flowers solitary or variously cymose, often in unilateral spikes, forming a terminal thyrse or panicle; calyx variously tubular, five-toothed or five-cleft, usually ten-nerved; petals five, with a narrow claw and an entire, bifid, or rarely laciniate lamina, often having two scales at base; stamens ten; disk usually columnar. Leaves opposite, entire. Amongst Silenes there are a few beautiful subjects for planting on rockwork, and in the open border, and none are difficult to cultivate. They succeed in almost any light, loamy soil, and may be readily propagated by one or more of the following methods—seeds, cuttings, or divisions. *S. pendula*, and its compact variety, are plants grown extensively for spring flower gardening, a purpose for which they are admirably adapted. The seed should be sown early in the previous autumn. The species best-known to cultivation are described below. All are hardy, except where otherwise indicated.

Silene—*continued.*

S. acaulis (stemless).* Cushion Pink; Moss Campion. *fl.* pink, rarely white, ½in. in diameter; calyx tubular, with obtuse teeth; petals notched. June to August. *l.* ¼in. to ½in. long, linear-subulate, close-set, channelled above, keeled below, ciliated. *h.* 2in. Europe (Britain), &c. A densely-tufted perennial. (A. F. P. 79; L. B. C. 568; Sy. En. B. 205.) *alba* is a white-flowered form.

S. alpestris (alpine).* *fl.* white, shining, rather large, panicled; calyx campanulately-clavate; petals with a four-toothed border and two-parted appendages. May to July. *l.* almost all radical, lanceolate, rather blunt. Stem simple, few-leaved. *h.* 6in. Austrian Alps, 1774. Perennial. (S. B. F. G. 111.)

FIG. 484. UPPER PORTION OF PLANT AND DETACHED FLOWER OF SILENE COMPACTA.

S. anglica (English). *fl.* in leafy, racemose cymes; calyx ¼in. long, membranous, with pubescent ribs, the teeth setaceous; petals and scales small, entire or slightly bifid. June to October. *l.* variable; lower ones spathulate. *h.* 1ft. to 2ft. Europe (Britain), &c. An erect or diffusely-branched annual. *S. gallica* is a form with white or pink flowers and bifid petals; *S. quinquevulnera*, another variety, has entire, white petals with a red spot. (Sy. En. B. 202.)

S. Armeria (Armeria). Sweetwilliam Catchfly. *fl.* pink, in corymbose panicles; calyx long, clavate; petals obcordate, crowned. July to September. *l.* ovate-lanceolate, rather cordate at base. Stem branched. *h.* 1ft. to 1½ft. France and Switzerland (naturalised in Britain). A smooth annual. (Sy. En. B. 204.)

S. Atocion (Atocion).* *fl.* pink, in fastigiate, trichotomous panicles; calyx long, clavate; petals obcordate, obtuse, with an acute tooth on each side at the base, crowned by two

Silene—*continued.*

protuberances. June and July. *l.* roundish-obovate; lower ones on long footstalks; uppermost ones sessile. *h.* 6in. to 12in. Stem branched, pubescent. Levant, 1781. Annual.

S. chloræfolia (Chlora-leaved). *fl.* white, turning reddish as they fade, large, in a terminal panicle; calyx long, striped; petals cloven half-way down, with a two-lobed crest. August and September. *l.* elliptical, pointed; upper ones rather cordate. Stems branched. *h.* 1ft. to 2ft. Armenia, 1796. A smooth perennial. (B. M. 807; B. R. 1989; S. B. F. G. ser. ii. 263.)

S. compacta (compact). *fl.* pink, crowded into dense corymbs; calyx very long, clavate; petals oboval, entire, crowned; bracts narrow, shorter than the pedicels. July. *l.* ovate-cordate, sessile; two large ones, like an involucre, near the corymb, appearing as if they were connate. Stem erect, branched. *h.* 1½ft. Russia, 1823. A glabrous, glaucous biennial. See Fig. 484. (L. B. C. 1638; S. B. F. G. 64.)

S. Elizabethæ (Elizabethan).* *fl.* 1½in. in diameter; calyx margined with purple; petals bright rose-colour, the claws white below, the blade cuneate-flabellate, emarginate; panicle terminal, dichotomous. July. *l.* lanceolate, acute, spreading; lower ones 2in. to 3in. long, becoming gradually smaller upwards. Stems tufted, erect or ascending, and, as well as the leaves, viscid-pubescent. *h.* 9in. or more. Italy, 1863. Perennial. (B. M. 5400; R. G. 1009, 2.)

S. fimbriata (fringed-petaled). *fl.* white, in large, spreading panicles; calyx greatly inflated, with broad teeth; petals fringed, incurved after flowering. May to August. *l.* large, ovate-lanceolate, undulated, on long footstalks. *h.* 2ft. to 4ft. Caucasus, 1803. A pubescent perennial. (B. M. 908.)

S. gallica (French). A variety of *S. anglica.*

S. Hookeri (Hooker's).* *fl.* 2in. to 2½in. in diameter, solitary in the axils, or sometimes obscurely cymose; calyx 1in. long; petals pale pink, 2in. long, the lobes very variable, narrow or broad, equal, or the outer ones smaller or reduced to teeth, the two parallel white ridges on the claw terminating in white teeth at the blade. May. *l.* 2in. to 3in. long; lower ones elliptic-spathulate, narrowed into long petioles; the rest elliptic-lanceolate, acute or acuminate; all pubescent. Stems many, decumbent. California, 1873. Perennial. (B. M. 6051; F. d. S. 2093.)

S. inflata (swollen). Bladder Campion or Catchfly; Cow Bell; White Ben. *fl.* white, ¾in. in diameter, drooping; petals deeply cloven; panicle many-flowered. June to August. *fr.*, capsule globose. *l.* 1in. to 3in. long, variable, ovate, obovate, or oblong. *h.* 2ft. to 3ft. Europe (Britain), &c. A branched, glaucous, glabrous, or downy perennial. This species may be used as a substitute for asparagus or green peas, the young shoots having the flavour of both. (Sy. En. B. 199.) *puberula* is a rarer form, with downy leaves.

S. lacera (torn-petaled). *fl.* white; calyx much inflated; petals jagged, with the appendages two-parted. May to August. *l.* ovate-lanceolate, undulated, on long footstalks. Caucasus, 1818. A procumbent, hispid biennial. (B. M. 2255.)

S. laciniata (jagged-petaled). *fl.* crimson, with a white, two-parted crest, very large, terminal, rather drooping; calyx cylindrically ventricose; petals somewhat four-cleft; peduncles one-flowered. June and July. *l.* large, lanceolate, acute. Stem erect, branched. *h.* 3ft. to 4ft. Mexico and California, 1823. A half-hardy, pubescent perennial. (B. R. 1444; P. M. B. 267.)

S. livida (livid). *fl.* livid-green on the under surface, white above, panicled, drooping to one side; petals two-cleft, crowned. June and July. *l.* oblong-lanceolate. Stem flexuous, infracted. *h.* 1ft. Carniola, 1816. A pubescent perennial.

S. maritima (maritime).* *fl.* white; petals shortly cleft, the segments broad, with two scales at the base. June to August. Europe (Britain). A diffuse perennial. Otherwise resembling *S. inflata.* (Sy. En. B. 200.) *flore-pleno* is a garden form, with double flowers.

S. noctiflora (night-flowering). *fl.* erect, few; calyx narrow, 1in. long; petals rosy within, yellow outside, two-cleft. July and August. *l.* 3in. to 4in. long, oblong-lanceolate, acute, the lower ones petioled. *h.* 1ft. to 2ft. Europe (Britain), &c. An erect, simple or dichotomous, softly pubescent annual, viscid above. The flowers open at night, and are very fragrant. (Sy. En. B. 209.)

S. nutans (nodding). Nottingham Catchfly. *fl.* white or pink, in panicled or sub-racemose cymes, drooping, fragrant at night; calyx purple-nerved, with acute teeth; petals two-parted, the segments diverging. May to July. *l.*, radical ones oblong-lanceolate, 2in. to 5in. long, tufted, petioled; cauline ones small, narrow, sessile. Stem viscid above. *h.* 2ft. to 3ft. Europe (Britain), &c. A pubescent perennial, with a woody rootstock. (Sy. En. B. 207.) SYN. *S. paradoxa.*

S. ornata (ornamented). *fl.* dark purple, panicled; calyx cylindrical, with alternate stripes and veins; petals two-parted, with broad, crowned lobes. May to September. *l.* lanceolate, rather blunt. Stems erect, branched. *h.* 2ft. Cape of Good Hope, 1775. A pubescent, greenhouse biennial. (B. M. 382.)

S. paradoxa (paradoxical). A synonym of *S. nutans.*

S. pendula (pendulous-flowered).* *fl.* flesh-coloured, axillary, pendulous; calyx inflated; petals bifid, crowned. May to August. *l.* ovate-lanceolate. Italy, &c., 1731. A pubescent, branched, trailing annual. (B. M. 114.)

S. p. compacta (compact).* A very dwarf, compact variety, forming dense cushions, 2in. to 3in. high and 9in. to 12in. in diameter, entirely covered with bright pink flowers. This is a charming plant, extensively used for spring bedding. (F. M. n. s. 84.)

S. pennsylvanica (Pennsylvanian).* American Wild Pink. *fl.* pink, clustered, short-stalked; calyx club-shaped; petals cuneiform, slightly notched and erose. April to June. *l.*, radical ones narrowly spathulate, nearly glabrous, tapering into hairy petioles; cauline ones two or three pairs, lanceolate. Stems 4in. to 8in. high. North America, 1806. A pubescent perennial. (B. R. 247; L. B. C. 41.)

S. picta (painted). *fl.* pink, loosely panicled; calyx clavate, striped with red; petals reticulated with red nerves and veins. June to August. *l.*, lower ones obovate-spathulate; upper ones linear, acute. Stems much-branched, scarcely pubescent. *h.* 1ft. to 2ft. Asia Minor and Syria, 1817. A beautiful, Rush-like annual. (S. B. F. G. 92.)

S. quinquevulnera (five-spotted). A variety of *S. anglica.*

S. regia. Royal Catchfly. *fl.* deep scarlet, numerous, short-stalked, in clusters, forming a strict panicle; petals spathulate-lanceolate, mostly undivided. July. *l.* rather thick, ovate-lanceolate, acute. Stem roughish, erect, 3ft. to 4ft. high. Southern United States, 1811. A pubescent perennial. (B. M. 1724; S. B. F. G. ser. ii. 313.)

S. Saxifraga (Saxifrage).* *fl.* terminal, solitary, rarely axillary; calyx clavate; petals yellowish on the upper surface, reddish-brown beneath; peduncles very long. June to August. *l.* linear, acute. *h.* 3in. to 6in. South Europe, &c., 1640. A smooth, rather viscid, tufted perennial. (L. B. C. 454.)

S. Schafta (Schafta).* *fl.* purple, erect; calyx more than 1in. long, clavate; petals cuneate, denticulate; peduncles bearing one or two flowers. June to October. *l.* obovate, acute. Stems many, very simple, ascending; root woody. *h.* not more than 6in. Persia, 1844. A beautiful little perennial; the branches gradually become covered with blossoms. (B. R. 1846, 20; J. H. S. i. 69.)

S. speciosa (showy). *fl.* scarlet, axillary or terminal, paniculate; calyx elongated-tubular, villous; petals five, oblong, spreading, four-parted, the middle segments much longer, the lateral ones reduced to teeth. June. *l.* opposite, sessile, lanceolate, somewhat obtuse. *h.* 1ft. 1843. A villous, greenhouse perennial; probably a hybrid. (F. d. S. ii. 8; P. M. B. x. 219.)

S. supina (supine). *fl.* white, on short, alternate pedicels; calyx long, cylindrically clavate, tomentose; petals with long claws, bifid, crowned. June to August. *l.* linear, acute. Stems woody, procumbent, branched. Caucasus, 1804. A tufted, clammy-pubescent perennial. (B. M. 1997.)

S. vespertina (evening). *fl.* rose-coloured, in secund racemes; calyx bladdery-clavate; petals two-parted, the lobes obtuse. June and July. *l.* spathulate, acute, on ciliated petioles. Stems branched, diffuse or decumbent. *h.* 1ft. Greece, &c., 1796. A beautiful, pubescent annual. (B. M. 677; S. B. F. G. 58; S. F. G. 409.)

S. virginica (Virginian).* Fire Pink. *fl.* deep crimson, few, and loosely cymose, peduncled; calyx oblong-cylindrical, soon obconical; petals oblong, two-cleft. June to August. *l.* thin, spathulate, or the upper ones oblong-lanceolate. Stems slender, 1ft. to 2ft. high. North America, 1783. A pubescent perennial. (B. M. 3342; R. G. 1116.)

SILENOPSIS. Included under *Lychnis.*

SILICA. A very abundant mineral in the soil, both in the pure state, and in combination with various elements forming Silicates. Pure Silica is made up of the two elements Silicon, or Silicium, and Oxygen, in the proportion of twenty-eight parts, by weight, of the former to thirty-two of the latter. It occurs in several conditions, of which the most frequent are quartz and flint, and the less common rock-crystal and calcedony. Amethyst and cornelian are forms of Silica, tinged red with iron oxides. Silica, in the form of quartz, is the chief ingredient of all sands and sandstones, as well as of granites and other minerals of the same general structure; and veins or masses of pure quartz of considerable size also exist. But almost more plentiful than Silica are the Silicates, chiefly of Potassium, Sodium, Calcium, and Magnesium. These are familiar to everyone as clay, mica, felspar, and other substances that make up the mass of most soils.

Silica is not soluble in pure water; but a little Carbonic Acid gas, dissolved in the water, permits of a little Silica being dissolved; and almost all water that gains

Silica—*continued.*

access to the roots of plants contains an appreciable amount of Silica, either pure or, more frequently, combined with alkalies. Silica exhibits the properties of a weak acid, in its power of combining with various metals. It combines with these, in more than one proportion, certain compounds, called normal or basic Silicates, containing a larger proportion of the alkali than do the others. These normal Silicates are the ones that dissolve in water.

Silicates (especially normal Potassic Silicate) pass into the root-hairs of the plants from the soil, dissolved in the water absorbed by the hairs, and are then carried up the stems, as described under **Sap.** They are easily broken up by the acids formed in plants during growth, *e.g.*, Oxalic and Citric Acid, &c.: the metals combine with these acids to form new compounds, and the Silica is set free in the cell-sap; but, not being so soluble as the Silicates, it is mostly added to the walls of the cells, and is peculiarly often found in the layer or cuticle on the outer surface of the stems or leaves. In some plants, this layer is so strong and continuous that all the vegetable substance may be destroyed by means of Nitric Acid, or by burning on platinum-foil over a spirit-lamp, without destroying the continuity and markings of the cuticle, which even extends over the hairs. Such a deposit of Silica in the epidermis is well shown in many grasses, and still better in the Horsetails or *Equiseta*; but it is met with also in many other plants, *e.g.*, in *Deutzia scabra*, where it forms a beautiful object when all the vegetable matter in the cuticle has been destroyed.

The use of Silica to plants is very doubtful. It is present in the ash of almost all plants. In many it is so abundant as to seem of much importance to them; yet the results of experiments on growing plants in artificial soils from which it is almost absent, tend to the conclusion that the growth of plants is not greatly interfered with even when the supply of Silica taken in by them is far below that usually present in them. For example, the straw of grasses is usually very rich in Silica (frequently to the amount of one-half of the ash) when grown in ordinary soils; yet grasses grown in artificial soils, from which it has been excluded as completely as possible, and whose ash, in consequence, contains less than 1 per cent. of Silica, prove as healthy and vigorous in every way as if they had been grown in ordinary soils. Probably, a large proportion of the Silica is absorbed in the form of alkaline Silicates, as mentioned above; and the Silica remains as a deposit in the cell walls after the alkalies have been made use of in the nutrition of the plants. It has been suggested that Silica may be of service in two ways, viz., in giving strength and rigidity to the stems, and in rendering the cuticle harder, so that when spores of parasitic Fungi fall upon it, and begin to germinate, the mycelium tubes find greater difficulty in piercing into the tissues of the plants. The Silica in the cuticle may thus be a defence against disease from this cause, but, necessarily, against only such Fungi as bore through the cuticle into the inner tissues, and not against those which push in their mycelium through stomata.

SILICATES. *See* **Silica.**

SILICLE. A siliqua as broad as it is long, or broader.

SILICULOSA. A Linnean artificial order of the class *Tetradynamia*, having siliculose pods.

SILIQUA. The long, pod-like fruit of *Cruciferæ*. It consists of a pair of valves applied to a frame on which the seeds grow.

SILIQUOSA. A Linnean artificial order of *Tetradynamia*, having siliquose fruit.

SILK-COTTON TREE. A common name for the genera *Bombax* and *Eriodendron*.

SILKEN SISSY. An old name for *Asclepias*.

SILK-TREE. A common name for *Albizzia Julibrissin*.

SILK VINE. A common name for *Periploca græca*.

SILKWOOD-TREE. A name applied to *Muntingia Calabura*.

SILKY. *See* **Sericeous.**

SILKY OAK. A popular name for *Grevillea robusta*.

SILPHA. A genus of Beetles, the larvæ of which usually feed in the rotting bodies of animals, and are especially numerous in dead moles, birds, and other so-called "vermin," hung up as scarecrows. The insects of this genus are, for the most part, considerably depressed or flattened from above downwards, oval in outline, about ½in. or ⅔in. long, with a small head, and furrowed wing-cases. They are almost entirely black, or brown-black, with a dull yellowish, downy coating, which is easily rubbed off. The grubs are more slender in form than the adult insects, and all the rings, except the three next the head, have the edges sharp, and prolonged forward into a tooth, and the tail ends in two sharp points. They are usually entirely black, or black with a narrow, tawny border. They are active in their habits, running about by means of three pairs of short but well-formed legs, situated on the front part of the body. When full-fed, they form cocoons in the soil, in which they become pupæ, and in due time beetles. As long ago as 1844, larvæ of a *Silpha* were found feeding on Beets, in France; and in the same year they proved seriously injurious to Mangel-Wurzel crops near Londonderry, in Ireland. They devoured the young leaves almost as soon as the latter appeared, till only the larger ribs remained, and the plants, in consequence, died off largely. Mangel-Wurzel and Beets alone suffered; and such crops as Oats, Wheat, Potatoes, and Turnips escaped unharmed in fields where the former plants were entirely destroyed. From larvæ feeding on Beets, in France, there were reared beetles belonging to the species *S. opaca*, known as the Beet Carrion Beetle; and the same insect was also identified as the culprit in Ireland. It is rather under ½in. long, flattened, and brownish-black, with the tip of the body dull red. There are three ridges down each wing-case. This beetle had long been known to frequent dead bodies of animals. It is probable that other species of *Silpha* also injure Beets and other garden produce.

Treatment. For the sake of prevention, only manure free from such substances (*e.g.*, offal) as might attract the beetles should be used for ground on which Beets and Mangel-Wurzel are to be grown. Should the plants be attacked, dressings of gas-lime and of sulphur or soot, scattered over the wet leaves in dewy mornings, would probably be of service in checking the evil, as would also be paraffin dressings. All methods of strengthening the plants and promoting the growth of new leaves are of great importance, and manures may enable the crops to pass through an attack without serious results. But should the attack prove fatal, it will be well to utilise the ground for some other crop, which may be sown or planted with safety in the infested soil immediately after the removal of the Beets or Mangolds.

SILPHIUM (*Silphion*, the ancient Greek name used by Hippocrates for a plant which produced some gum-resin, perhaps asafœtida, and which was transferred by Linnæus to this genus). Rosin-plant. ORD. *Compositæ*. A genus consisting of eleven species of tall, coarse, hardy, perennial herbs, with a copious resinous juice, confined to North America. Flower-heads yellow, large, corymbose-panicled; involucre broad and rather flat the scales imbricated in many rows; ray florets numerous, fertile; disk florets sterile; achenes glabrous, surrounded by a wing, which is notched at the top. Leaves alternate,

Silphium—*continued.*

opposite, or whorled, entire, toothed, or lobed. The best-known species are described below. Dr. Asa Gray says of *S. laciniatum*: "On the wide, open prairies the leaves *are said* to present their faces uniformly north and south, whence it is called the Compass-plant"; this peculiarity, according to other authorities, is more noticeable in young specimens. Any ordinary soil is suitable for the culture of these plants, which are best placed at the backs of flower-beds. They may be increased by division.

FIG. 485. INFLORESCENCE AND LEAF OF SILPHIUM LACINIATUM.

S. laciniatum (torn).* Compass Plant; Pilot Weed; Polar Plant. *fl.-heads* few, 1in. to 2in. broad, somewhat racemose; involucral scales rigidly pointed; achenes broadly winged. July. *l.* pinnatipartite, petioled but dilating and clasping at base, the lower and radical ones ovate, 1ft. to 2½ft. long; divisions lanceolate or linear, acute, cut-lobed or pinnatifid, rarely entire. *h.* 3ft. to 6ft. Plant rough-bristly. See Fig. 485. (B. M. 6534.)

S. perfoliatum (perfoliate-leaved). *fl.-heads* corymbose; achenes winged and variously notched. July. *l.* entire, ovate, 6in. to 15in. long, coarsely toothed, the upper ones united by their bases, and forming a cup-shaped disk, the lower ones abruptly narrowed into winged petioles, which are connate by their bases. Stem 4in. to 8in. high, square. (B. M. 3354.)

S. terebinthinaceum (terebinthine). Prairie Dock. *fl.-heads* small; involucral scales roundish, obtuse, smooth; achenes narrowly-winged. July to September. *l.* ovate and ovate-oblong,

Silphium—*continued.*

somewhat cordate, serrate-toothed, rough, especially beneath, 1ft. to 2ft. long, on slender petioles. Stem smooth, 4ft. to 10ft. high, panicled at the summit, and bearing many heads. (B. M. 3525.)

S. trifoliatum (three-leaved). *fl.-heads* loosely paniculate; achenes rather broadly winged. August. *l.*, cauline ones lanceolate, pointed, entire or scarcely serrate, rough, short-petioled, in whorls of three or four, the uppermost ones opposite. Stem smooth, rather slender, 4ft. to 6ft. high, branched above. (B. M. 3355.)

SILVER BELL TREE. *See* **Halesia.**

SILVER BERRY. The fruit of *Elæagnus argentea.*

SILVER BRACTS. A common name for *Cotyledon Pachyphytum.*

SILVER BUSH. A common name for *Anthyllis Barba-Jovis.*

SILVER CEDAR. *See* **Juniperus virginiana glauca.**

SILVER FIR. The popular name for *Abies pectinata.*

SILVER-GRAIN. The glittering plates, in exogenous wood, caused by the division of the medullary rays.

SILVER ROD. A common name for *Asphodelus ramosus.*

SILVER-TREE. *See* **Leucadendron argenteum.** The name is also applied to *Elæagnus.*

SILVER WEED. *See* **Argyreia.** The name is also used for *Potentilla Anserina.*

SILVER Y MOTH. *See* **Plusia.**

SILYBUM (an old Greek name, applied by Dioscorides to some Thistle-like plants). ORD. *Compositæ.* A monotypic genus. The species is a glabrous, erect, biennial herb, included, in some books, under *Carduus.* "The specific name, *Marianum*, was given to this plant to preserve the legend that the white stain on the leaves was caused by the falling of a drop of the Virgin Mary's milk" (Lindley). The plant was formerly cultivated for culinary purposes, the root being boiled as a potherb, the heads treated like those of Artichokes, and the leaves used as a spring salad. It occurs in waste places, near gardens, &c., but is not indigenous to Britain. Any ordinary soil is suitable for its culture. Propagated by seeds.

S. Marianum (St. Mary's).* Blessed, Holy, or Our Lady's Milk Thistle. *fl.-heads* rose-purple, globose, 1in. to 2in. in diameter; involucral bracts coriaceous, closely appressed, with one very stout, terminal spine; receptacle fleshy, hairy, not pitted. July to September. *l.* large, alternate, sinuately lobed or pinnatifid, white-spotted above; teeth or lobes spiny. *h.* 1ft. to 4ft. South Europe, &c. (Sy. En. B. 681.)

SIMABA (the native name in Guiana of one of the species). SYN. *Zwingera.* ORD. *Simarubeæ.* A genus comprising about fourteen species of stove, evergreen or deciduous trees or shrubs, natives of South America. Flowers small or rather large; calyx small, four or five-lobed; petals four or five, longer than the calyx, spreading, valvate; disk narrow, erect; stamens eight to ten, included; panicles loose-flowered, short or elongated. Carpels one to five, drupaceous, the endocarp usually hard. Leaves alternate, impari- or abruptly pinnate, rarely one to three-foliolate; leaflets entire, coriaceous. Three species have been introduced, but *S. Cedron* is probably the only one now known in cultivation in this country. This is a small tree, remarkable for the febrifugal properties of its seeds, which have also been, from time immemorial, reputed, in its native place, as a remedy for snake-bites. It thrives in well-drained, turfy loam. Propagated by cuttings of the ripened wood, inserted in sand, under a glass, in heat; or by imported seeds.

S. Cedron. Cedron-tree. *fl.* disposed in racemes 3ft. to 4ft. long. May. *fr.* about the size of a swan's egg, one-seeded, four of the cells being barren. *l.* large, pinnate; leaflets twenty or more, narrow-elliptic, livid-green above, paler beneath. Trunk simple, erect, slender. *h.* 20ft. New Granada, 1846.

FIG. 486. SIMPLE LEAF.

SIMAROUBA (the Carib name of *S. amara*). Frequently spelt *Simaruba*. Bitter-wood. ORD. *Simarubeæ*. A small genus (three species) of stove, evergreen trees, natives of Eastern tropical America. Flowers sub-cymose, in axillary and terminal, elongated, branched panicles; calyx small, five-lobed; petals five, spreading at the tips, imbricated. Leaves alternate, abruptly pinnate; leaflets alternate, entire, coriaceous. Probably, the only species grown in this country is *S. amara*, which yields the drug known as Simaruba-bark. For culture, *see* **Quassia** (to which the genus is allied).

S. amara (bitter). Bitter or Mountain Damson; Stavewood. *fl.* yellowish-white; petals spreading; panicle exceeded by the leaves. May. *l.* oblong or lanceolate-oblong, mucronate, with a bluntish point, green on both sides; leaflets quite glabrous or pubescent beneath. *h.* (under cultivation) 10ft. West Indies, &c., 1789. (B. M. Pl. 56.) SYN. *S. officinalis*.

S. officinalis (officinal). A synonym of *S. amara*.

SIMARUBA. *See* **Simarouba.**

SIMARUBEÆ. A natural order of scentless shrubs or trees, often small, mostly inhabiting tropical and warm regions. Flowers diclinous or polygamous, rarely hermaphrodite, regular, usually small; calyx three to five-lobed or parted; petals three to five, very rarely wanting, imbricated or valvate; stamens inserted at the base of a hypogynous disk, as many, or twice as many, as the petals, rarely indefinite; inflorescence usually axillary, paniculate or racemose, rarely spicate or a solitary flower. Fruit a drupe, capsule, or samara. Leaves alternate or rarely opposite, pinnate, rarely one to three-foliolate or simple, not dotted, very rarely glandular; stipules wanting. Bark often bitter, sometimes very much so. The Simaruba of the druggist is yielded by the bark and trunk of *Simarouba amara* and *S. guianensis*. *Balanites ægyptiaca* bears drupes which, when old, are edible. The order comprises thirty-one genera, and about 112 species. Examples: *Balanites, Quassia, Simaba, Simarouba.*

SIMETHIS (so named after the nymph Simethis, the mistress of Acis). SYNS. *Morgagnia, Pogonella*. ORD. *Liliaceæ*. A monotypic genus. The species is a slender, hardy, perennial herb, with a root of fascicled fibres. It is found at Bournemouth, and at Derrynane, in Ireland, but is only an alien or a denizen. A compost of heath mould and sand is most suitable. The plant may be multiplied by division.

S. bicolor (two-coloured). *fl.* ⅔in. in diameter, corymbose, jointed on the pedicel; perianth spreading, the segments white inside, purple on the back; scape panicled, as long as the leaves, bracteate. June. *l.* 6in. to 18in. long, ¼in. in diameter, recurved, surrounded at base with torn, fibrous, brown sheaths. Europe, North-west Africa. (Sy. En. B. 1541.) SYN. *S. planifolia*.

S. planifolia (flat-leaved). A synonym of *S. bicolor*.

SIMMONDSIA (named in memory of T. W. Simmonds, botanist and explorer, who accompanied Lord Seaforth to the West Indies, and who died in 1805). SYN. *Brocchia*. ORD. *Euphorbiaceæ*. A monotypic genus. The species is a small, hardy, evergreen, much-branched shrub. A compost of rich, light loam, and a little peat, is best suited to its requirements. Propagation may be effected by cuttings.

S. californica (Californian). *fl.* green, diœcious, apetalous, inconspicuous; males in sub-globose, sessile or very shortly pedunculate clusters, solitary or sessile beneath a small bract; females solitary, on short and usually nodding pedicels. Mature nuts resembling an acorn in size and shape. *l.* opposite, sub-sessile, entire, coriaceous, penniveined. California.

SIMPLE. Consisting of not more than one distinct part; *e.g.*, a Simple leaf has one blade (see Fig 486).

SIMPLER'S JOY. *See* **Verbena hastata** and **V. officinalis.**

SINAPIS (from the old Greek *Sinapi*, used by Theophrastus for Mustard). ORD. *Cruciferæ*. A small genus of European and Asiatic herbs, frequently cultivated, now included, by Bentham and Hooker, under *Brassica*. Calyx of four spreading sepals. Pods sessile, slightly terete or tetragonal; seeds globose. *S. alba* yields the white, and *S. nigra* the black, mustard. Both species are indigenous in this country, but are nevertheless largely cultivated. The seedlings or cotyledons of *S. nigra*, together with those of *Lepidium sativum*, form the salad well known as Mustard and Cress. Oil is obtained from several plants of this genus. The seeds of *S. arvensis* (the common Charlock or Corn Mustard) yield a good burning oil. Some authorities regard *S. nigra*, which, in Palestine, grows to a height of from 10ft. to 12ft., as the Mustard of Scripture, in preference to *Salvadora*. None of the species possess any horticultural value. *See also* **Cress** and **Mustard.**

SINCLAIRIA. Included under **Liabum** (which *see*).

SINGHARA NUT-PLANT. *See* **Trapa bispinosa.**

SINISTRORSE. Turned or directed to the left.

SINNINGIA (named in honour of William Sinning, gardener to the University of Bonn on the Rhine). SYN. *Gloxinia* (many cultivated species). Including *Biglandularia, Ligeria, Rosanovia, Stenogastra* and *Tapeionites*. ORD. *Gesneraceæ*. A genus comprising about sixteen species of very pretty, usually dwarf, pubescent or villous, stove herbs, natives of Brazil. Flowers showy, rarely rather small, solitary or fascicled in the axils, on short or long pedicels; calyx tube short and broadly turbinate, the limb leafy, deeply five-cleft or five-parted; corolla tube sub-equal at base or gibbous at back, elongated, broadly cylindrical or campanulate, the limb of five broad, spreading lobes; stamens included. Leaves opposite, often ample, long-stalked; floral ones reduced to bracts. Stems rising from a tuberous rhizome, simple or scarcely branched, sometimes almost wanting. The species best known to cultivation are described below. They require similar treatment to **Gloxinia** (which *see*).

S. barbata (bearded). *fl.*, calyx nearly lin. deep; corolla white, with red marks inside, much swollen at base, contracted at throat, hairy, 1½in. long; peduncles ½in. to 1½in. long, axillary, solitary or twin. Summer. *l.* oblong or oblong-lanceolate, a few inches to nearly 1ft. long, attenuated at both ends, acute, crenate-serrate, pilose above, crimson beneath; petioles ½in. to 1½in. long. Stem decumbent or ascending. 1867. (B. M. 5623; F. d. S. 1847; F. M. 336, under name of *Tapeionites Carolinæ*.) The variety *major* (I. H. n. s. 506) only differs from the type in its larger proportions.

S. concinna (neat).* *fl.*, calyx rather small, the segments much longer than the tube; corolla lurid-purple above, yellowish beneath, spotted within, nearly lin. long, the tube much dilated towards the throat; peduncles axillary, scape-like, longer than the leaves. Summer and autumn. *l.* broadly round-ovate, deeply crenate, rather small. Stem ½in. to lin. long, and, as well as the petioles, peduncles, and nerves, red. 1860. (B. M. 5253, under name of *Stenogaster concinna*; F. d. S. 1533 and I. H. 1864, 390, under name of *Stenogastra concinna*.) The variety *multiflora* (I. H. 1864, 390, left-hand figure, under name of *Stenogastra multiflora*) is a handsome garden plant, with larger leaves than its parent, and lilac-blue flowers.

S. conspicua (conspicuous).* *fl.*, calyx segments lanceolate, spreading; corolla yellow, paler without than on the inside, the lower part of the tube marked on the inside with elegant, purple lines and dots, obliquely infundibular-campanulate. Summer. *l.* opposite, ovate-oblong, shortly acuminate, slightly cordate at the base, dentate. Rhizome tuberous. *h.* 1ft. Brazil, 1868. Plant hairy, free-flowering. SYNS. *Biglandularia conspicua* and *Rosanowia conspicua* (R. G. 712). *Rosanowia ornata* (F. d. S. 2423-4) is a fine hybrid, with flowers of a pure white, lined with light rose on the tube and the two upper lobes of the corolla, the throat slightly greenish-yellow.

Sinningia—*continued.*

S. guttata (spotted). *fl.*, calyx narrow-campanulate; corolla pale greenish, the tube very thickly spotted with purple or fuscous dots, the upper lip of the limb slightly reclinate; peduncles shorter than the calyx, nearly equalling the petioles. June. *l.* oblong-ovate, acuminate, cuneate at base, crenate-toothed, entire at base, velvety-pubescent. Stem ascending, slender, leafy. *h.* 1½ft. 1827. This species much resembles *S. velutina*. (B. R. 1112; P. M. B. ii. 4.)

S. Helleri (Heller's). *fl.*, calyx red, large, sometimes 2in. long; corolla white, the throat greenish and spotted with red, often 3in. long, tumid at base, the lobes of the limb broad and round; peduncles erect, scarcely 1in. long. June. *l.* convex, ovate-oblong, 4in. to 7in. long, acute, mostly cuneate at base, crenate-serrate, velvety-pubescent, more or less approaching the soil; petioles (as well as the peduncles, stem, and under surface of leaves) purplish. Stem a few inches high, thick, and slightly woody. 1820. (B. R. 997; B. M. 4212, under name of *S. velutina*.)

S. hirsuta (hairy). *fl.*, calyx red, ½in. long, very villous, the segments sub-erect; corolla lilac, twelve to fourteen lines long and broad, the limb dotted with violet, the lobes sub-emarginate, the tube pale pilose outside, purple-spotted within; peduncles glomerate or sub-racemose, shorter than the leaves. July. *l.* few, broadly ovate, obtuse, cordate, 3in. to 5in. long, deeply crenate, purplish beneath; petioles 1in. to 1½in. long. Stem a few inches long, prostrate, clothed with long, white villi. 1824. (B. M. 2690, B. R. 1004, and L. B. C. 1296, under name of *Gloxinia hirsuta*.)

S. Menziesiana (Menzies'). *fl.*, calyx large, with very long, linear-lanceolate segments, densely hairy-villous; corolla ample, the limb violet, the throat copiously dotted with red; peduncles longer than either petioles or flowers. August. *l.* ovate, obtuse, cordate, crenate, villous. Stem shortened. (B. M. 3943, under name of *Gloxinia speciosa Menziesii*.)

FIG. 487. SINNINGIA SPECIOSA.

S. speciosa (showy).* *fl.*, calyx segments ovate-lanceolate, shortly villous; corolla usually violet in the type, ample, campanulate. September. *l.* oblong, obtuse or slightly acute, convex, usually attenuated at base, crenate, velvety and sparsely pilose. Stem short. 1815. From this species a large number of very beautiful garden varieties and hybrids have been raised, a list of which will be found under their popular name, **Gloxinia** (which *see*). See Fig. 487. SYNS. *Gloxinia Passinghamii* (P. M. B. xii. 267), *G. speciosa* (B. 105, 149; B. M. 1937; B. R. iii. 213, xxx. 48; L. B. C. 28), *Ligeria speciosa*. A selection of garden forms, widely differing in colour, are figured as Gloxinias in the following works: R. G. 1852, 4, and 1853, 44; P. M. B. xi. 199, and xv. 169; F. d. S. 1885 and 1918.

S. s. albiflora (white-flowered). *fl.* white. (B. M. 3206, under name of *Gloxinia speciosa albiflora*.)

S. s. caulescens (caulescent). *l.* larger than in the type. Stem produced, thick. 1826. (B. R. 1127 and L. B. C. 1566, under name of *Gloxinia caulescens*.)

S. s. macrophylla (large-leaved). *l.* very large, with white nerves. 1844. (B. M. 3934, under name of *Gloxinia speciosa macrophylla variegata*.)

S. s. rubra (red). *fl.* of a splendid red. (P. M. B. vii. 271, under name of *Gloxinia rubra*.)

S. velutina (velvety). *fl.*, calyx infundibular-campanulate, 1in. long, with triangular segments; corolla pale greenish, 1½in. to 2in. long, gibbous at base, constricted at throat, the limb spreading; peduncles shorter than the calyx. June. *l.* ovate, acute, rounded or nearly cordate at base, 2in. to 4½in. long, green on both sides, the nerves, as well as the stem and petioles, at length purplish, crenate-serrated, puberulous or often nearly glabrous above. Stem erect, sometimes 1½ft. high, slender, leafy. 1827. (L. B. C. 1398.)

Sinningia—*continued.*

S. villosa (villous). *fl.*, calyx amply or shortly campanulate, spreading, the segments ovate and slightly acute; corolla yellowish-green, almost semi-globose, 1½in. to 2in. long, the limb 1in. broad, sub-equal, spreading; peduncles shorter than the petioles. June. *l.* oblong-ovate, convex, acuminate, sometimes nearly lanceolate, 3in. to 5in. long, usually acute at base, crenate. Stem erect, 1½in. or more thick. *h.* 1ft. 1827. (B. R. 1134.)

S. Youngiana (Young's).* *fl.* axillary or terminal, solitary; calyx lobes ovate, acuminate; corolla more or less intensely violet or purple, with the exception of the campanulate tube, which is yellowish-white at the base, and at the throat, which is spotted; lobes almost equal, round. Summer. *l.* opposite, petiolate, oblong or ovate, crenated, pale or almost whitish below. Stem erect, purplish, 1ft. to 1½ft. high. Rhizome tuberous, several inches in diameter. A hybrid between *S. speciosa* and *S. velutina*. (B. M. 4954.)

FIG. 488. SINUATE LEAF.

SINUATE. Having a strongly waved or recessed margin. A Sinuate leaf is shown at Fig. 488.

SINUS. A term applied to the recesses formed when the edge of any part is lobed.

SIPHOCAMPYLOS (from *siphon*, a tube, and *kampylos*, curved; alluding to the form of the corolla). SYN. *Lobelia* (of Presl). ORD. *Campanulaceæ*. A large genus (nearly 100 species) of very beautiful, glabrous, hairy, or stellate-tomentose, stove or greenhouse herbs, sub-shrubs, or shrubs, sometimes climbing, natives of tropical America. Flowers red, orange, or purplish, rarely greenish, usually large; calyx tube adnate, the limb of five leafy lobes; corolla straight or incurved, the lobes often incurved, equal or unequal, sometimes bilabiate, the lateral ones sometimes connate with the upper ones; staminal tube adnate to the base of the corolla; peduncles one-flowered, ebracteate or minutely bibracteolate, axillary or forming clustered corymbs or loose racemes at the tips of the branches. Leaves alternate, rarely whorled, entire or denticulate, rarely incised-toothed or pinnately lobed or dissected. The introduced species are described below. They succeed in a light, turfy loam, and peat, and are propagated by cuttings. Except where otherwise indicated, they are herbaceous perennials.

S. amœnus (pleasing). A synonym of *S. villosulus*.

S. betulæfolius (Birch-leaved).* *fl.* red; calyx segments six times shorter than the corolla; pedicels axillary, solitary, exceeding the leaves. July. *l.* petiolate, ovate, acuminate, sub-cordate-triangular, 2in. long, somewhat doubly serrated, glabrous above, slenderly pubescent on the nerves beneath; petioles nearly 1in. long. Stem branched, terete, glabrous. *h.* 3ft. Organ Mountains, 1842. Stove. (B. M. 3973; P. M. B. ix. 223.)

S. bicolor (two-coloured). A garden synonym of *Lobelia laxiflora angustifolia*.

S. canus (hoary). A synonym of *S. macropodus*.

S. coccineus (scarlet).* *fl.* scarlet, nodding; corolla dilated upwards and curved, the limb scarcely bilabiate; peduncles longer than the leaves, axillary, solitary, one-flowered. July. *l.* ovate, acute, shortly petiolate, sometimes slightly lobed, doubly serrated. *h.* 3ft. Organ Mountains, 1844. A glabrous, stove sub-shrub. (B. M. 4178; F. d. S. ii. 9; P. M. B. xii. 173.) The variety *leucostomus* (F. d. S. 648) differs from the type in having the limb of the corolla almost white. A garden form, raised in the gardens of the King of Belgium, in 1850.

Siphocampylos—*continued.*

S. crenatifolius (crenate-leaved). *fl.* scarlet, tipped with yellow, axillary, solitary. Summer. *l.* oblong-elliptic, irregularly crenate, 5in. to 6in. long. *h.* 3ft. Brazil, previous to 1870. A showy, warm greenhouse shrub. (Ref. B. 227.)

S. fimbriatus (fringed). A synonym of *S. longepedunculatus.*

S. fulgens (brilliant). A synonym of *S. Humboldtianus.*

S. giganteus (gigantic). *fl.* reddish-yellow; corolla falcate, velvety, the tube equalling the calyx lobes, the lobes lanceolate-ovate; pedicels bibracteolate at base, often longer than the leaves. July. *l.* lanceolate, cuspidate-acuminate, 6in. to 9in. long, narrowed at base, scarcely petiolate, wrinkled, crenate-toothed, glabrous above, pilose beneath. Stem 14ft. or more in height; branches pubescent. New Grenada. Stove.

S. glandulosus (glandular).* *fl.* rose-coloured, nodding; calyx lobes spreading, with reflexed margins, deeply glandular-serrated; corolla tube curved, compressed, clavate, the limb segments nearly equal, erecto-patent; peduncles axillary, solitary, shorter than the leaves, one-flowered, bibracteate below the middle. July. *l.* rather long-stalked, cordate, wrinkled, doubly toothed. *h.* 3ft. Bogota, 1845. A softly pubescent, stove plant. (B. M. 4331; F. d. S. 401.)

S. hamatus (hooked). *fl.* violet, in short, dense, terminal racemes; calyx lobes hooked, spreading; corolla tube curved, laterally angular-compressed, the segments nearly equal, elongated; primary bracts hooked at apex. June. *l.* alternate, petiolate, oblong-ovate or slightly cordate, acuminate, attenuated towards the base, irregularly toothed, the nerves prominent beneath. *h.* 6ft. Brazil, 1849. A tomentose-pubescent, greenhouse plant.

S. Humboldtianus (Humboldt's).* *fl.* scarlet; calyx lobes ovate-triangular, shorter than the tube; corolla tube straight, the segments ovate-lanceolate, upper ones longer; pedicels axillary, compressed, equalling the leaves. Summer. *l.* petiolate, ovate or lanceolate, acute at both ends, argutely denticulate, glabrescent above. Branches angular, densely pubescent. *h.* 3ft. Peru, 1867. Stove. (B. M. 5631.) SYN. *S. fulgens* (F. M. 313).

S. lantanifolius (Lantana-leaved). *fl.* purplish, eight to ten together; calyx velvety; corolla narrow, incurved, with acuminate lobes; pedicels corymbose. July. *l.* ovate, acute, 1½in. long, obtuse at base, sometimes slightly cordate, shortly petiolate, glabrous and wrinkled above, fuscous-tomentose beneath, the margins denticulate. Branches straight, simple, somewhat woody, terete. *h.* 3ft. Caraccas, 1841. Stove shrub.

S. l. glabriusculus (slightly glabrous). *l.*, together with the pedicels and calyx, scarcely pubescent. (B. M. 4105, under name of *S. lantanifolius.*)

S. longepedunculatus (long-pedunculate). *fl.* purplish, on axillary pedicels longer than the leaves; calyx segments acute, much shorter than the corolla; corolla nearly 2in. long, narrow, sub-arcuate. January. *l.* alternate, ovate, acuminate, 3in. to 4in. long, membranous, cordate, petiolate, argutely toothed. Stem terete, 3ft. high. Rio de Janeiro, 1841. Stove. (B. M. 4015.) SYN. *S. fimbriatus* (R. G. 600).

S. macropodus (large-footed). *fl.* bluish-red; calyx hairy; corolla four times as long as the calyx, the tube ventricose above, the inferior lobes reflexed; pedicels almost equalling the leaves, puberulous. June. *l.* ovate, acute, 3in. long, shortly petiolate, crenate, slightly hairy above, pubescent beneath. Stem slightly branched, hairy, 2ft. to 3ft. high. Minas Geraës. Stove. SYN. *S. canus.*

S. manettiæflorus (Manettia-flowered).* *fl.* red and yellow, as long as the leaves; calyx segments subulate, serrated; corolla laterally compressed, the segments nearly equal, erecto-patent; peduncles solitary, axillary, one-flowered, bibracteate, three or four times longer than the leaves. April. *l.* very shortly petiolate, oblong-ovate, obscurely serrated, reticulated, shining above. *h.* 1ft. New Grenada, 1848. An erect, dwarf, stove sub-shrub. (B. M. 4403; P. M. B. xv. 267.) SYN. *S. nitidus* (of gardens).

S. microstoma (small-mouthed). *fl.* scarlet, shortly pedunculate, in terminal umbels; calyx segments obtuse, spreading; corolla pubescent, swollen above, laterally compressed, the segments small, linear, obtuse, connivent, pilose. September. *l.* alternate, shortly petiolate, ovate, acute, 2in. long, glandular-serrate, glabrous. Stem 2ft. to 3ft. high, glabrous; branches terete. New Grenada, 1844. An erect, stove sub-shrub. (B. M. 4286; F. d. S. 444; L. & P. F. G. ii. 44.)

S. nitidus (shining). A garden synonym of *S. manettiæflorus.*

S. Orbignianus (d'Orbigny's). *fl.* yellow and red, numerous in the upper axils; calyx lobes thrice as long as the tube; corolla much longer than the calyx, with linear lobes; pedicels half as long as the leaves. July. *l.* ternate, ovate, acuminate, shortly petiolate, unequally and acutely toothed, 3in. to 4in. long, puberulous beneath. Branches erect, terete. *h.* 2ft. or more. Bolivia, 1849. Stove. (B. M. 4713; F. d. S. 544; L. & P. F. G. i. p. iii.; L. J. F. iv. 425.)

S. penduliflorus (pendulous-flowered). *fl.* scarlet, nodding; calyx segments two or three times as long as the tube; corolla segments linear, half exceeding the tube; pedicels lin. long; racemes terminal, solitary, long, loose-flowered. June. *l.* opposite, rather long-stalked, ovate-oblong, slightly acute, remotely serrulated, rather thick. *h.* 2ft. Caraccas, 1847. A highly glabrous, stove, climbing shrub. (F. d. S. 763.)

Siphocampylos—*continued.*

S. scandens (climbing). *fl.* scarlet, scattered, on pedicels two to four lines long; corolla tube nearly 1in. long, the segments falcate, sub-equal, reflexed. July. *l.* petiolate, reflexed, oblong, obtuse, 1in. to 1½in. long, somewhat acute at base, slightly fleshy, the margins quite entire and revolute. Stem climbing. Peru, 1847. Stove shrub.

S. surinamensis (Surinam). A synonym of *Centropogon surinamensis.*

S. villosulus (slightly hairy). *fl.* reddish-orange; corolla small, nearly straight, the segments narrow and acute; pedicels longer than the calyx; racemes terminal, many-flowered. June. *l.* alternate, oblong-lanceolate, acuminate, narrowed into the petiole, above silky, and of a pleasing green, very shortly puberulous beneath. Stem branched. *h.* 3ft. Brazil, 1832. Greenhouse. (F. d. S. 619; L. & P. F. G. ii. p. 135, under name of *S. amœnus.*)

SIPHONANDRA. A synonym of **Chiococca** (which *see*).

SIPHONANTHA. A synonym of **Clerodendron** (which *see*).

SIPHONIA. A synonym of **Hevea** (which *see*).

SIPHONIOPSIS. A synonym of **Cola** (which *see*).

SIPHONOPHORA. A genus of Aphides or Greenflies, distinguished by long, slender honey-tubes or siphons, borne on the hinder part of the body (see Fig. 489). It includes a very large number of species, several of them injurious to cultivated plants, *e.g.*, Roses.

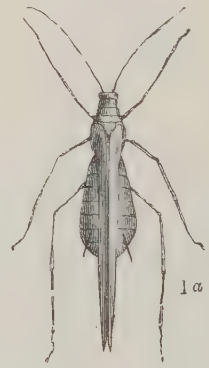


FIG. 489. SIPHONOPHORA ROSÆ — *a*, Line showing the natural length.

SIREX. A genus of Sawflies, the larvæ of which feed in the wood of Conifers, in which they bore tunnels, often about ⅓in. wide. They thus injure the trees, and ruin the wood for carpentry. Only two species are known as British; these are *S. juvencus* (the Steel-blue Sirex) and *S. gigas* (the Giant Sirex). They agree in general form. The body is nearly cylindrical. In the female, the last ring of the abdomen bears a strong spine, directed backwards; and from the lower surface of the abdomen arises a strong ovipositor, also pointed backwards, in which lies the "saw," used for boring into tree-trunks. The ovipositor is about half as long as the body. The four wings are large, powerful, and transparent. The legs and antennæ are also well developed. The length, without the ovipositor, varies from about ½in. to 1½in., but is usually over 1in. The mode of life is as follows: The female bores with her saw into the bark of trees, preferring sickly ones if they are to be found, and deposits in each hole an egg, from which, after a time, a white, soft, cylindrical larva emerges. The larva tunnels in the wood of the tree. The duration of the larval stage is uncertain. Some believe that it is

Sirex—*continued.*

passed through in a few weeks; but the perfect insects have emerged at intervals for many years from wood to which the larvæ could not have got access after the trees had been felled and sawn into planks. The larvæ have strong jaws, six very small feet near the head, and a bluntly-pointed tail. They change in their tunnels into pupæ. From these the perfect insects emerge, from July to September.

S. juvencus, or the "Steel-blue Sirex," is, as the name denotes, usually of a dark steel-blue colour, with red-brown feet; in the males, several segments of the abdomen are rusty-red. The wings, in both sexes, are yellowish, with smoky hind margin. The females are usually 1¼in. long, the males rather below 1in. This insect is not rare. It prefers Scotch Firs, though it also feeds in other Conifers.

S. gigas, or the Giant Sirex, is rather larger than the other species, from which it also differs in colour. It is ringed with black and yellow; the latter colour is duller in the males. This species is less common than the former. The larvæ are said not to attack Scotch Firs; but feed in Spruce, Silver Firs, and occasionally in Larch.

Remedies. It is not possible to destroy the larvæ in infested trees. To prevent the injury from spreading, sickly trees, and all fallen branches and trunks, should be cut up and removed; and this should be done also with all trees that show traces of serious injury, in the form of holes through which the insects have escaped. The timber of such trees is of little value, save as firewood, because of the injury done to it by the larvæ.

SIRIUM. A synonym of **Santalum** (which *see*).

SISARUM. Included under *Pimpinella.*

SISSOO-TREE. A common name for *Dalbergia Sissoo.*

SISYMBRIUM (an old Greek name, used by Theophrastus for Mint). Hedge Mustard. Including *Alliaria.* ORD. *Cruciferæ.* A genus comprising eighty species of hardy, mostly annual or biennial herbs, usually inhabiting the temperate and cold regions of the Northern hemisphere, but rarely occurring in the Southern. Flowers usually yellow, rarely white or rose, loosely racemose, rarely axillary. Radical leaves stellate; cauline ones alternate. Five species are included in the British Flora: *S. Alliaria* (Garlic Mustard, Jack-by-the-Hedge, Sauce Alone), *S. Irio* (London Rocket, so called because it sprang up after the Great Fire), *S. officinale* (Bank Cress, common Hedge Mustard), *S. Sophia* (Flixweed), and *S. Thaliana* (Thale Cress). The genus has no horticultural value.

SISYRINCHIUM (an old Greek name, used by Theophrastus for the Iris). Blue-eyed Grass; Pig Root; Rush Lily; Satin Flower. SYN. *Souza.* Some of the plants included here were formerly placed under *Bobartia.* ORD. *Irideæ.* A genus comprising about fifty species of mostly hardy or half-hardy perennials, with fibrous roots; all are natives of tropical or extra-tropical America, and one has become naturalised in Ireland. Flowers many in a spathe, pedicellate; perianth with scarcely any tube, and sub-equal, obovate or oblong lobes; stamens affixed at the base of the perianth. Leaves radical or clustered at the base of the stem, linear-terete or more or less ensiform, always narrow; cauline ones few or none. Stems equal or slightly thickened at base. A selection of the species best known in gardens is given below. All thrive in a compost of sandy loam and leaf mould. Propagation may be effected by seeds, or by offsets, in spring.

S. anceps (two-headed). A synonym of *S. angustifolium.*

S. angustifolium (narrow-leaved). *fl.* of a paler blue than in *S. Bermudiana.* *l.* narrower, and whole plant smaller. Eastern United States (naturalised in New Zealand and Australia, also in Ireland). SYNS. *S. anceps, S. gramineum* (B. M. 464).

Sisyrinchium—*continued.*

S. Bermudiana (Bermudan). This differs from *S. angustifolium* in being much larger in all its parts, and strikingly so in its broad leaves, which are equitant at the base. *h.* 1½ft. to 2ft. Bermudas. SYN. *S. iridioides* (B. M. 94).

S. californicum (Californian). *fl.* many in succession, scentless; perianth of a uniform yellow, explanate, the segments obovate-oblong, obtuse; anthers orange-coloured; fascicle many-flowered; scape quite simple, longer than the leaves, curved. Autumn. *l.* several, distichous, 1ft. to nearly 2ft. high, about ¼in. broad, linear-ensiform. California, 1796. Half-hardy. SYN. *Marica californica* (B. M. 983).

S. chilense (Chilian). *fl.*, perianth purple, yellow at the base, three to five lines long; bracts leaf-like; spathe linear, acuminate, about three-flowered; peduncles flexuous, very slender, 1in. to 1¼in. long. July. *l.*, radical ones linear-ensiform, striated, 3in. to 12in. long, one to two lines broad. Stem 6in. to 12in. high, flexuous. Brazil, &c., 1826. Half-hardy. (B. M. 2786.)

S. Douglasii (Douglas'). A synonym of *S. grandiflorum.*

S. filifolium (thread-leaved).* *fl.* campanulate, erect; perianth white, like porcelain, each segment delicately lined with pale purplish-red. May. *h.* 6in. to 8in. Falkland Islands, 1885. Plant of Rush-like habit. (B. M. 6829; G. C. n. s., xxiii. p. 696.)

S. gramineum (grass-like). A synonym of *S. angustifolium.*

S. graminifolium (grass-leaved). *fl.* slightly exserted above the spathe; perianth yellow, the segments obovate, mucronate; spathes terminal, few or many-flowered, the outer one leafy, 1½in. long, the inner 1in. long. April. *l.*, radical ones 8in. long, scabrous on the margins, acuminate, sheathing at base; cauline ones 3in. to 6in. long. Stem branched, erect, 7in. to 9in. high. Chili, 1825. Half-hardy. (B. R. 1067.)

S. g. ascendens (ascending). *fl.*, spathes very hairy, equal. *l.*, radical ones 4in. to 6in. long; cauline ones 2in. to 3in. long, alternate. Stem 5in. to 9in. high. (B. R. 1914, under name of *S. g. pumilum.*)

S. g. maculatum (spotted). *fl.*, perianth segments marked with dark blood-coloured spots. (B. M. 3197, under name of *S. maculatum.*)

FIG. 490. SISYRINCHIUM GRANDIFLORUM.

S. grandiflorum (large-flowered).* Spring Bell. *fl.*, perianth dark purple, striated, the segments obcordate, unguiculate, eight to ten lines long; spathe two-flowered, erect, leafy, terminal, two-valved. May. *l.* erect, broadly linear, spreading, striated, 6in. to 8in. long, sheathing at base. Stem 8in. to 10in. long, quite simple. Root creeping. North America, 1826. A pretty hardy plant. See Fig. 490. (B. M. 3509; B. R. 1364; G. C. n. s., xxi. p. 216; R. H. 1868, p. 190; S. B. F. G. ser. ii. 388.) SYN. *S. Douglasii* (F. d. S. 146). There is a variety of this with white flowers.

S. iridifolium (Iris-leaved).* *fl.* on slender pedicels, pubescent beneath; perianth yellowish-white, the segments about ½in. long, cuneate-ligulate, slightly mucronate; spathes terminal, the outer one 1½in., the inner 1in., long, carinate; peduncles geniculate. June. *l.* linear-ensiform, incurved at apex, scabrous-ciliated on the margins; radical ones 4in. to 8in. long; cauline ones 2in. to

Sisyrinchium—*continued.*

4in. long. Stem branched, 4in. to 12in high. Brazil to Chili, 1822. Half-hardy. (L. B. C. 1979.) SYNS. *S. laxum* (B. M. 2312), *Marica iridifolia* (B. R. 646).

S. iridioides (Iris-like). A synonym of *S. Bermudiana.*

S. laxum (loose). A synonym of *S. iridifolium.*

S. lutescens (yellowish). A synonym of *S. striatum.*

S. micranthum (small-flowered). *fl.* three to ten, small, pedicellate; perianth yellow, ⅛in. long; spathes terminal, the outer one about 1in., the inner ½in., long. June. *l.* linear-ensiform, striated, glabrous; radical ones 1in. to 4in. long, one line broad; cauline one bract-like, 1in. long. Stem glabrous, one-leaved, simple, flexuous, 2in. to 9in. high. Mexico and Brazil, &c., 1815. Half-hardy. (B. M. 2116.)

S. striatum (striated). *fl.* nine to twelve, spicate, alternate, exceeding the ovate, cuspidate spathe; perianth yellowish, the tube two lines, the segments seven lines, long; pedicels nearly equalling the spathe. June. *l.* glabrous; radical ones about 1ft. long, distichous, equitant, sheathing; cauline ones rather remote, amplexicaul. Stem 1ft. to 2ft. high, simple or branched. Chili, 1788. Hardy. SYNS. *S. lutescens* (L. B. C. 1870), *Marica striata* (B. M. 701).

S. tenuifolium (slender-leaved). *fl.*, perianth yellow, the segments oblong, acute; pedicels sparsely hairy, exceeding the spathe; spathe two-leaved, terminal, one or many-flowered. *l.* linear-ensiform, scabrous on the margins, acuminated, striated; radical ones 2½in. to 9in. long; cauline ones 2in. to 4in. long. Stem ascending, simple or branched, 1½in. to 12in. high. Mexico, 1816. Hardy. (B. M. 2117, 2313.)

SITOCODIUM. A synonym of *Camassia.*

SITODIUM. A synonym of *Artocarpus.*

SITOLOBIUM. Included under **Dicksonia** (which *see*).

SITONA. A genus of small beetles belonging to the family of Weevils. It includes those popularly known as Pea-and-Bean-Weevils, which receive this name because of the harm they do to the Pea and Bean crops, especially in field cultivation. But they also feed on many other leguminous plants, *e.g.*, Clover. In them the beak is shorter than in most Weevils, and projects horizontally. It is flat, except for a slight channel along its upper surface. The antennæ are elbowed. The body is oblong, with the thorax a good deal narrower than the abdomen. The beetles are about ⅛in. or a little more in length. Their ground-colour is black; but this is almost always more or less concealed by a coat of ochreous, grey, or rosy scales and hairs. These scales and hairs are apt to be rubbed off, and to disappear after a time. The most hurtful species are *S. crinita*, the Spotted Pea-weevil, and *S. lineata*, the Striped Pea-weevil. The former bears ten punctured stripes down the wing-cases, these stripes being alternately dark and light ochreous. The former species is a little smaller than *S. lineata*, is more grey or rosy than that insect, and has a few dark spots on the wing-cases. Both have the limbs, for the most part, dull-red.

The beetles feed on Peas, Beans, and other leguminous plants, gnawing the young leaves and leaflets from the margins inwards, and, in this way, sometimes completely destroy the crops, if the weather is cold and unfavourable to growth after the young plants have come through the soil. Strong, healthy plants suffer least from them. The life-history of these Weevils has been followed out, within the past three or four years, by Messrs. Hart and Christy. The larvæ feed on the roots of Clover, and, it may be presumed, of other *Leguminosæ*. They have been observed of all sizes and ages in the autumn, and many of them live through the winter as larvæ, and reach their full size in spring. When full-grown, they are footless, wrinkled, white maggots. They become pupæ in oval, earthen cells, 1in. to 2in. below the surface of the soil; and in two or three weeks they emerge as beetles. It would thus seem that the larvæ are injurious; but the beetles are far more so. They are apt to remain undetected in their depredations, as, when in danger, they drop at once from the plants to the soil and hide under particles of earth, &c.; but pressure, or stamping with the feet, on the soil around the plants, makes the beetles

Sitona—*continued.*

come out in swarms. They seem to pass the winter in open ends of stubble, or in any other convenient retreat.

Remedies. The best is probably to make up the seed-bed so as to be favourable to rapid and healthy growth of the young plants, thus rendering them able to survive the attacks of the Weevils. For the same reason it is well to water the plants in dry weather. It is recommended also to lay wood-ashes or coal-ashes along the drills above the rows of Peas or Beans, as this favours growth. Rolling the ground brings the Weevils to the surface, and kills many of them. Applications of lime or soot to the wet leaves renders these distasteful to the insects; but the most useful application yet tried is paraffin, in a solution of about two ounces to one gallon of water, with which the plants should be watered.

SIUM (from *Sion*, the old Greek name, used by Dioscorides). Water Parsnip. ORD. *Umbelliferæ*. A small genus (four species) of glabrous, hardy herbs, natives of North temperate regions, South Africa, and St. Helena. Flowers white, in compound umbels; involucral bracts numerous. Leaves pinnate; pinnæ toothed. *S. angustifolium* and *S. latifolium* are British plants. *S. Sisarum* (Skirret) is removed, by Bentham and Hooker, to *Pimpinella*. The species possess no horticultural value.

SKIMMIA (from *skimmi*, a Japanese word, signifying a hurtful fruit). ORD. *Rutaceæ*. A genus comprising about half-a dozen species of pretty, hardy, evergreen, highly glabrous shrubs, with green branchlets, natives of the Himalayas and Japan. Flowers whitish, clustered; calyx short, four or five-lobed; petals four or five, oblong, much longer than the calyx, valvate or loosely imbricated; disk inconspicuous; panicles terminal, branched. Drupes ovoid, fleshy, two to four-stoned. Leaves alternate, simple, petiolate, lanceolate, entire, coriaceous, pellucid-dotted. The species thrive in a compost of peat and loam. Propagation may be effected by cuttings, inserted in sand, under a bell glass, in gentle heat; and by seeds, sown, when ripe, in sandy loam and peat.

FIG. 491. TIP OF BRANCH, WITH INFLORESCENCE, OF SKIMMIA FRAGRANS.

S. fragrans (fragrant). *fl.* white, fragrant, disposed in terminal panicles. *l.* elliptic-oblong, thick. *h.* about 3ft. See Fig. 491. (R. H. 1880, p. 56, Fig. 11.) Of this garden plant only the female is at present known.

Skimmia—*continued.*

S. fragrantissima. *See* **S. oblata.**

S. intermedia (intermediate). *fl.* white, rosy on the outside, scented, disposed in spike-like panicles. Spring. *l.* narrow-elliptic, coriaceous, deep green. 1870. A much-branched and compact, garden variety, intermediate between *S. fragrans* and *S. japonica.*

FIG. 492. BRANCHLET, WITH FLOWERS AND FRUITS, OF SKIMMIA JAPONICA.

S. japonica (Japanese).* *fl.* white, resembling those of some Hollies, deliciously scented; petals spreading; panicles thyrsoid, pedunculate, broadly-oblong, many-flowered. *fr.* roundish-oval, bright red. March. *l.* alternate, but here and there crowded, so as to appear sub-verticillate, oblong, acuminated, entire, pellucid-dotted, tapering into short footstalks. *h.* rarely above 3ft. or 4ft. Japan, 1845. A very handsome shrub when in full berry. See Fig. 492. (B. M. 4719; G. C. n. s., xxv. p. 244; I. H. 1854, 13; L. & P. F. G. ii. 163; S. Z. F. J. 68.)

S. j. argentea variegata (silvery-variegated). *l.* oblong, acuminated, broadly and unequally bordered with white. 1875

FIG. 493. BRANCHLET IN FLOWER AND FRUIT, AND DETACHED FLOWER, OF SKIMMIA OBLATA VEITCHII.

Skimmia—*continued.*

S. Laureola (Laureola).* *fl.* pale yellow, very fragrant, densely disposed in terminal, compact corymbs; rachis and peduncle purple-dotted. Spring. *fr.* ovate, smooth, nearly as large as an olive. *l.* approximating at the tips of the branches, sub-opposite or ternate, oblong-lanceolate, acute, attenuated at base, entire, 3in. to 5in. long, dark green above, yellowish beneath. *h.* 4ft. Nepaul. A very pretty, Citron-scented shrub. SYN. *Limonia Laureola.*

S. oblata (oblate-berried).* *fr.* very bright vermilion-red, oblate, glossy, borne in panicled clusters. *l.* firm, smooth, elliptic-obovate, bright green. Japan, 1864. (G. C. n. s., xxv. p. 245.) A remarkably beautiful, dwarf shrub, of dense habit. The male or pollen-bearing plant is known in gardens by the name of *S. fragrantissima.*

S. o. Veitchii (Veitch's). *fl.* hermaphrodite or monœcious, in spike-like racemes; petals dirty-white. Spring. *fr.* spherical, of a beautiful coral-red. *l.* flat, elliptic, oboval, glossy, narrowed into a thick petiole. *h.* 3ft. See Fig. 493. (R. H. 1880, p. 57, fig. 13.)

S. ovata (ovate). This appears to be a garden form of *S. japonica*, with larger, broader leaves than the type.

FIG. 494. FLOWERING BRANCHLET, AND PORTION OF DETACHED INFLORESCENCE, OF SKIMMIA RUBELLA.

S. rubella (reddish).* *fl.* greenish-white, disposed in thyrses, odorous; buds tinted with red, hence the name. *l.* lanceolate-elliptic, leathery. China, 1874. See Fig. 494. (R. H. 1874, 311; 1880, p. 57, fig. 12; 1885, p. 189.)

SKINNERIA. Included under *Ipomœa.*

SKIOPHILA. Included under **Episcia** (which *see*).

SKIPJACKS. *See* **Wireworms.**

SKIRRET (*Sium Sisarum*). A perennial, cultivated, but not extensively, for its roots, which are rather large, and composed of fleshy, tuberous prongs joined together, as shown in Fig. 495. Leaves pinnatisect; segments oblong-acute, serrate; involucre five-leaved, reflexed. The roots are white, and are cooked and served in a similar way to those of Salsafy. Skirret may be propagated by slipping off the side roots before growth commences in spring, and dibbling them in ordinary garden soil, but it is generally increased by seeds. These should be sown in drills, about 1ft. apart, early in April, and the seedlings thinned, when large enough, to 6in. or 8in. asunder. A rather light soil, which has not been very lately manured, is best suited to the requirements

Skirret—*continued.*

of Skirret. The roots may be used from the end of September onwards, through the winter; before growth commences in spring, they should be lifted and stored in moderately dry sand.

FIG. 495. TUBEROUS ROOTS OF SKIRRET.

SKIRWORT. An old name for **Skirret** (which *see*).

SKULL CAP. *See* **Scutellaria.**

SKUNK CABBAGE OR WEED. *See* **Symplocarpus fœtidus.**

SLASHED. The same as **Laciniate** (which *see*).

SLATERIA. A synonym of **Ophiopogon** (which *see*).

SLIPPER FLOWER, or **SLIPPERWORT.** *See* **Calceolaria.**

SLIPPER, LADY'S. *See* **Cypripedium.**

SLIPPER SPURS. *See* **Pedilanthus.**

SLIPPERWORT. *See* **Calceolaria** and **Campanula.**

SLIPS, PROPAGATION BY. A term used in reference to plant-propagation in cases where a specimen may be taken up and divided into several pieces, each of which shall have roots attached, and be capable of forming a plant itself when placed under the proper conditions. Common Box is referred to as an example of a plant that may be increased in almost any quantity from Slips. There are many other subjects which may be similarly propagated.

SLOANEA (named in honour of Sir Hans Sloane, born in Ireland in 1660, President of the Royal Society, founder of the British Museum and the Chelsea Botanic Garden; he died in 1753). ORD. *Tiliaceæ*. A genus comprising about thirty species of stove, tropical American trees. Flowers racemose, panicled, or fascicled, axillary or terminal, rarely solitary; sepals or calyx lobes four or five, valvate, rarely coalescing; petals absent, or very rarely one to four, sepaloid; stamens numerous. Leaves alternate or sub-opposite, entire or toothed, penninerved. The two species introduced are fine trees, with large leaves. A compost of loam and peat is most suitable. Propagated by cuttings of ripened wood, inserted in sand, under a glass, in heat.

S. dentata (toothed). *fl.* white, large. August to November. *l.* ovate, acute, bluntly toothed; stipules cordate-triangular, serrated. *h.* 50ft. 1752.

S. sinemariensis (Sinemaria). *fl.* white, small; racemes axillary. July and August. *l.* roundish-ovate, entire, 1ft. long; stipules long, acuminated, deciduous. *h.* 50ft. 1820.

SLOE. *See* **Prunus spinosa.**

SLOPES. In gardening, any piece of land on an inclined plane may be called a Slope; but the term is most generally used in reference to lawns when they are naturally or artificially undulated. Grass or lawn Slopes have to be laid out much in accordance with the space they occupy, and the disposition of the land above and below them. In forming Slopes, the land should be made equally firm throughout, to prevent one part subsiding more than another after the work is finished; a practised eye is one of the principal helps in rendering the surface and incline uniform. When alterations are in progress, the formation of a Slope often saves an immense amount of work, by utilising spare soil or forming an undulating surface of that naturally placed, instead of carting it away. Gardens situated on sloping ground have an advantage in being more readily drained than if they were on the level, they are also much better situated, provided the aspect is favourable for exposure to the sun.

SLOW-MATCH TREE. A common name for *Careya arborea.*

SLUGS. These molluscs are only too well known to everyone, because of the injury done by them to almost all kinds of garden produce. They are especially partial to young, newly-opened leaves of salad plants, *e.g.*, Lettuce; but they also eat holes in Carrots, Turnips, and other fleshy roots, and are frequently very troublesome among flowers, not only in borders, but also when potted. Slugs are far less frequently seen than might be expected from their extreme abundance, because of their habit of living concealed, during dry weather, by day, and coming out only after a shower, or at night. Several species are very common. The more important and destructive of these are the following: *Arion ater*, the Black Slug, is usually more common by roadsides and in waste places than in gardens; this animal is usually black, though sometimes reddish, but its form and general aspect are easily recognised, whatever the colour. *A. hortensis*, the Garden Slug, is also common, but is smaller and more slender, and shows grey stripes lengthwise. *Limax maximus* is our largest Slug, some specimens being 6in. long when stretched out. This species, when full grown, is easily known by its size, but is not abundant anywhere, though more common than it seems. It is spotted and streaked with black. *L. flavus*, the Yellow Slug, and *L. agrestis*, the Field Slug, are very common all over the country; and *L. arborum*, the Tree Slug, and *L. Scwerbii*, the Keeled Slug, are plentiful in some parts of Britain. In all the Slugs of the genera *Arion* and *Limax*, the body seems quite naked, the shell being reduced to a small, useless vestige, inclosed in the swollen part in front, known as the mantle. By all of them, in common with most molluscs, the tongue is used for cutting their food; it is a long belt, or riband, bearing cross rows of small, horny teeth; as these are worn away on the front of the riband, it is renewed by growth behind. The number and forms of the teeth, and the development of the shell, are of great use in distinguishing the species of Slugs. They all move about by means of contractions and elongations of the broad, flat, lower surface, or foot.

Remedies. Among the most effectual are baits, such as cabbage or lettuce leaves, hollowed slices of apples, carrots, potatoes, or turnips, laid near the plants that peculiarly need protection. These traps should be frequently examined, and the Slugs knocked off into ammoniacal solution, *e.g.*, gas-water; or they may be covered with quicklime, or with wood-ashes, salt, or soot. All these latter applications require to be repeated once at least, as the Slugs resist their action by throwing out a thick coat of slime, from which they can crawl out not much the worse; but they seem unable to repeat this operation

Slugs—*continued.*

immediately, if they are covered with the materials a second time. A ring of quicklime or of soot on the soil around choice plants, forms a protection against injury by Slugs, which will not cross these substances. A successful method of destroying Slugs is to water the soil with solution of ammonia; this brings them out, and usually kills them; and, in any case, they are rendered white and conspicuous, and can easily be picked up and put into a vessel for removal. Hand-picking is most effectual in moist evenings; but this method is slow and irksome, though effectual with potted plants. Trees may be protected against the ascent of Slugs to the fruit, by tying a new horsehair rope round the stem, or by putting a layer of quicklime or soot, &c., on the soil round the trunks. The layer should be renewed as required.

Slugs and Snails can lower themselves from branches, by threads formed of the thickened slime in which they are enveloped. One genus of Slugs, found in various places in the South of England, may be regarded as useful in gardens; this is *Testacella*, represented in England by *T. haliotidea*, and near Bristol by *T. Maugei*, which was naturalised, and has recently become abundant there. These two species live on earthworms, which they follow into their burrows. They are easily known by the existence of a small shell on the hind part of the body. *See* **Testacella.**

SLUGWORMS. By this name are denoted the larvæ of certain Sawflies belonging to the genus *Eriocampa*, and characterised by their slug-like form and habits. The larvæ have the body covered with a secretion, which on some is white, and flaky or powdery, while on others it is dark green or black, and slimy, increasing their likeness to miniature slugs; on the larvæ of some species it is yellowish, and is but small in amount. The Sawflies are small, with short, stout, black and glossy bodies. The legs are black, with the tibiæ and tarsi marked with rings varying from white to a more or less yellow tint. The antennæ are short, and thickened in the middle. The arrangement of cells in the neuration of the fore wings is also characteristic. The more common species are the following: *E. annulipes*, feeding on the lower surface of the leaves of Lime, Oak, Birch, and Willow; *E. limacina* (*Selandria Cerasi* in Miss Ormerod's "Manual of Injurious Insects"); *E. ovata*, feeding on Alder; and *E. Rosæ*, the larvæ of which feed on the upper surface of leaves of Roses, and gnaw away the epidermis. The larvæ of *E. limacina* are pre-eminently *the* Slugworms, because of their form, dull colour, sluggish habits, dark, slimy excretion, and general appearance. The damage done by them to the leaves

FIG. 496. ERIOCAMPA LIMACINA (the Larva of this is the Slugworm of fruit-trees)—*a*, Line to show actual spread of wings.

of fruit-trees is, at times, very great. This Sawfly (see Fig. 496) is about $\frac{1}{5}$in. long, and is black and shining, but hairy; the tibiæ are yellow-brown or brownish; the wings are transparent, except a broad, smoky band in the middle. The eggs are laid on the lower surface of the leaves. The larvæ, when newly-hatched, are white, but soon become greenish-yellow, with a black head. The whole body is covered with a dark, resinous secretion. In form, it is broader just a little behind the head, which is over-arched by a hump; from this point it tapers rapidly backwards. At the last moult, the

Slugworms—*continued.*

resinous coat is thrown off, and the head becomes coloured like the body. The larvæ feed on a great variety of trees and shrubs, chiefly among *Rosaceæ*, *e.g.*, Almond, Apple, Bramble, Cherry, Hawthorn, Pear, Plum, &c.; but they also live sometimes on Birch, Oak, &c. They congregate, in companies of three or four, on the upper surface of the leaf, feeding on the epidermis only; but the whole leaf becomes brown, dead, and shrivelled, and at last falls off. The larvæ are very voracious, and are also very sluggish in their habits. They may be found during autumn. When full-fed, they fall to the ground, burrow into it, and there spin black cocoons for their protection while in the pupa stage.

Remedies. Many remedies have been employed. The best is hellebore, mixed with water, poured from a watering-pot on the larvæ. Tobacco-water, and lime-water, with about 1lb. of soft soap to fifteen gallons of the fluid, are recommended; and soapsuds by themselves have been found useful. The pupæ may be destroyed, in winter, by skimming the surface soil, to a depth of 3in. or 4in., from below the trees and bushes infested by the insects, and burning it. The Sawflies are sluggish, and can be caught by shaking or beating the plants over an umbrella or sheet, or tarred boards. They are abundant throughout Europe and in North America, and are said to have been introduced into New Zealand.

SMALL ERMINE MOTH. *See* **Hawthorn Caterpillars.**

SMALL FLAX LILY. *See* **Phormium Cookianum.**

SMALL STAG BEETLE. *See* **Lucanus.**

SMEATHMANNIA (named after Smeathmann, a naturalist, who travelled in Africa, and collected many botanical specimens). SYN. *Bulowia*. ORD. *Passifloreæ*. A genus comprising four species of beautiful, stove, evergreen shrubs, with robust, terete branchlets, natives of Western tropical Africa. Flowers white, inodorous, rather large, axillary, sub-solitary, shortly pedunculate, bibracteolate; calyx with a very short tube, and five oblong lobes; petals five, slightly longer than the calyx; corona coriaceous, ciliated, urceolate, crenulated or lobed; stamens about twenty. Leaves oblong, coriaceous, serrated; petioles bearing one to four glands at the apex. The species, two of which have been introduced, are remarkable for their erect habit, in a natural order including so many creepers and twiners. A compost of loam, peat, and sand, is best suited to the requirements of these shrubs. Propagation may be effected by half-ripened cuttings, inserted in sand, under a glass, in heat.

S. lævigata (smooth-stalked). *fl.* curved downwards; petals oblong, spreading, as well as the calyx; stamens and pistil elongated, on a short, thick stipes. July. *l.* alternate, somewhat distichous, coarsely serrated, tapering at the base into a short petiole. Branches spreading. *h.* 6ft. 1823. (B. M. 4194.)

S. pubescens (downy). *fl.* large, on short, axillary peduncles; sepals and petals acute and spreading; stigmas downy. February. *l.* alternate, shortly petiolate, oblong, glossy, acute, penninerved, sinuately dentate, obtuse at the base; petioles scarcely two lines long, with very conspicuous glands. Branches terete; young ones, as well as the petioles, midribs of the leaves beneath, peduncles, and sepals, ferruginously hairy. *h.* 6ft. 1845. (B. M. 4364.)

SMEGMADERMOS. A synonym of **Quillaja** (which *see*).

SMILACEÆ. A tribe of *Liliaceæ*.

SMILACINA (a diminutive of *Smilax*, to which genus, however, the plants bear little resemblance). False Solomon's Seal. SYNS. *Asteranthemum*, *Jocaste*, *Medora*, *Neolexis*, *Polygonastrum*, *Sigillaria*, *Tovaria*. ORD. *Liliaceæ*. A genus embracing nearly a score species of mostly hardy perennials, natives of North and Central America, and temperate and mountainous Asia. Flowers small, on short pedicels; perianth at length deciduous,

Smilacina—*continued.*

the segments distinct or shortly connate towards the base; stamens six; inflorescence terminal, shortly pedunculate, racemose or forming a simple panicle; bracts small or obsolete. Leaves alternate, very shortly petiolate, ovate, lanceolate, or rarely narrow. The best-known species are described below. They succeed in any light soil, and may be readily increased by divisions.

S. bifolia (two-leaved). A synonym of *Maianthemum bifolium.*

S. borealis (Northern). A synonym of *Clintonia borealis.*

S. canadensis (Canadian). A synonym of *Maianthemum bifolium.*

S. oleracea (culinary).* *fl.* in a deltoid, terminal panicle, minutely bracteate; perianth white, tinged with rose outside, globose, about ¼in. long and broad; pedicels ¼in. long, deflexed or ascending. May. *fr.*, berry rose-purple, with dark spots. *l.* 6in. to 7in. long, alternate, oblong-acuminate, minutely pubescent beneath. Stem sub-erect, simple. *h.* 4ft. Sikkim, 1877. (B. M. 6313, under name of *Tovaria oleracea.*)

S. racemosa (racemose). False Spikenard. *fl.* on solitary pedicels; perianth whitish, one line long; panicle oblong or deltoid, shortly pedunculate, 2in. to 6in. long, the branches dense-flowered, ascending. May. *l.* ten to fifteen, ascending, oblong or lanceolate, acuminate, 3in. to 9in. long, paler and puberulous beneath. *h.* 2ft. to 3ft. North America, 1640. (B. M. 899, under name of *Convallaria racemosa.*)

S. stellata (star-like).* Star-flowered Lily of the Valley. *fl.*, perianth white, two to three lines long; racemes somewhat dense, ten to twenty-flowered, very shortly pedunculate, 1in. to 1½in. long. May. *l.* six to fifteen, ascending, oblong or lanceolate, 2in. to 6in. long, acute or acuminate, sessile and semi-amplexicaul, glaucous and puberulous beneath. *h.* 1ft. to 2ft North-west America, 1633. (B. M. 1043 and L. B. C. 1080, under name of *Convallaria stellata.*)

S. uniflora (one-flowered). A synonym of *Clintonia uniflora.*

SMILAX (the ancient Greek name used by Theophrastus). American China Root. TRIBE *Smilaceæ* of ORD. *Liliaceæ.* This genus embraces, according to Alph. de Candolle, 187 species of stove, greenhouse, or hardy, sarmentose shrubs, rarely dwarf and sub-herbaceous, broadly dispersed over temperate and tropical regions. Flowers small, dicœcious, pedicellate, in umbels (or cymelets), often numerous; stamens of the males six, rarely indefinite; staminodes of the females six or fewer; umbels pedunculate or sessile, axillary or terminal. Leaves alternate, distichous, or rarely opposite, often perennial; petioles furnished with two tendrils; floral leaves usually reduced to bracts. *Smilax* is, on the whole, one of the most important genera from an economic standpoint. The roots of several species constitute the well-known Sarsaparilla of our shops. The rootstocks of *S. China* are eaten by the Chinese; and those of *S. Pseudo China* are used in the manufacture of a kind of beer in South Carolina. A selection of species grown in gardens is given below. They boast of no particular beauty, but are plants of considerable interest, and mostly hardy. A sandy-loam soil is best adapted to their requirements. Propagation may be effected by divisions of the root.

S. aspera (rough).* Prickly Ivy. *fl.* whitish or flesh-coloured, fragrant; spikes longer or shorter than the leaves. July. *l.* frequently cordate at base, hastate- or deltoid-lanceolate, acuminate or cuspidate, sometimes white-spotted. Stems prickly. *h.* 5ft. to 10ft. South Europe, &c., 1648. (S. F. G. 959.)

S. a. angustifolia (narrow-leaved). *l.* narrow, elongated. (L. B. C. 1799, under name of *S. sagittæfolia.*)

S. a. mauritanica (Mediterranean).* *fl.* greenish-yellow, fragrant. A very beautiful, half-hardy, evergreen climber, of considerable size, well suited for conservatory decoration. 1884. (G. C. n. s., xxii. p. 185.)

S. a. punctata (spotted). A variety having the leaves spotted with white. (R. G. 683.)

S. asperrima (very rough). A garden name for a plant which at present cannot be determined.

S. auriculata (auricled). *fl.* small, very fragrant. *fr.*, berry small, globular. *l.* green, glossy, and widened at the base so as to become sub-hastate; the front portion three-nerved, with two short, additional nerves in the widened basal angles. Stems striated, freely furnished with short, white, recurved spines. Southern United States, 1884. An elegant, half-hardy, evergreen climber.

Smilax—*continued.*

S. australis (Southern). *fl.* white, or pale green or purple; umbels many-flowered, on axillary peduncles. Summer. *l.* from ovate-lanceolate or oblong to nearly orbicular, 2in. to 4in. long, or rarely much larger; petioles short and twisted. Stems and branches usually more or less armed with scattered prickles. *h.* 3ft. to 5ft. or more. Australia, 1791. SYN. *S. latifolia.*

S. Bona-nox (Good-night). *fl.* greenish-white; peduncles longer than the petioles. June and July. *l.* tardily deciduous, varying from round-cordate and slightly contracted above the dilated base to fiddle-shaped and halberd-shaped or three-lobed, green and shining on both sides, cuspidate-pointed, the margins often somewhat bristly-ciliate or spinulose. Branches and branchlets sparsely armed with small, rigid prickles. *h.* 5ft. to 10ft. North America, 1739. SYN. *S. tamnoides.*

S. B.-n. hastata (halberd-shaped). *l.* narrower than in the type, thickly beset with prickles on the margins. 1820.

S. B.-n. rubens (reddish). *l.*, tendrils purplish. Branches sparsely prickly. (W. D. B. 108, under name of *S. rubens.*)

S. China. China Root. *fl.* greenish-white; peduncles much shorter than the leaves, longer than the petioles. August. *l.* deciduous, ovate-rounded, the young ones abruptly narrowed and acute at the base, at length sub-cordate, acute, cuspidate, or retuse at apex, entire. *h.* 20ft. China and Japan, 1759. The edible root is very large, fleshy, and reddish.

S. discolor (discoloured). *l.* about 9in. long and 4in. broad, oblong-ovate, suddenly acuminate, firm, irregularly blotched when young with purplish-brown, five-nerved. Mexico.

FIG. 497. SMILAX ORNATA.

S. glauca (glaucous). *fl.* greenish-white; peduncles longer than the petioles, flattened. July. *l.* tardily deciduous or partly persistent, ovate, rarely sub-cordate, glaucous beneath, and sometimes also above (as well as the young branchlets), abruptly mucronate, the edges smooth and naked. Branches terete, and, as well as the somewhat quadrangular branchlets, armed with scattered, stout prickles, or naked. *h.* 3ft. North America, 1815. (B. M. 1816; W. D. B. 111, under name of *S. Sarsaparilla.*)

S. glycyphylla (sweet-leaved). Botany Bay Tea and Tree *fl.*, perianth nearly globular in bud; peduncles axillary and simple, or a few of the upper ones in a terminal panicle. Summer. *l.* lanceolate or ovate-lanceolate, 1½in. to 3in. long or rarely more, acute or acuminate, narrowed or rounded, or rarely almost cordate at base, rigid, often glaucous or white beneath, sometimes green on both sides; petioles twisted, bearing slender tendrils. Australia. Plant glabrous, unarmed. Greenhouse.

S. herbacea (herbaceous). Carrion Flower. *fl.* carrion-scented; peduncles elongated, 3in. to 4in., or sometimes 6in. to 8in., long, twenty to forty-flowered. June. *l.* much shorter than the peduncles, long-petiolate, membranous, ovate-oblong or rounded, mostly cordate, mucronate-tipped, smooth. Stem herbaceous,

Smilax—*continued.*

never prickly, erect and recurved, or climbing. North America, 1693.

S. h. Simsii (Sims'). *l.* ovate-acuminate, sub-acute or obtuse at base, small. (B. M. 1920, under name of *S. herbacea.*)

S. lanceolata (lance-shaped). *fl.* greenish-white; umbels sometimes panicled; peduncles short, seldom exceeding the petioles, terete. June and July. *l.* thinnish, rather deciduous, varying from ovate-lanceolate to lanceolate-oblong, narrowed at base into the short petiole, shining above, paler or glaucous beneath, many of them without tendrils. Branches terete, unarmed. *h.* 15ft. to 20ft. North America, 1785.

S. latifolia (broad-leaved). A synonym of *S. australis.*

S. macrophylla maculata (large-leaved, spotted). A synonym of *S. ornata.*

S. marmorea (marbled). A garden name for a plant which probably belongs to *S. ornata.*

S. officinalis (officinal). *fl.* unknown. *l.* oblong, slightly acute at base, abruptly acuminate at apex, membranous, 5in. to 7½in. long; petioles 2in. to 5in. long, the margins inflexed, sheathing. Young branches sub-cylindric, becoming somewhat quadrangular, armed with reflexed prickles. Chiriqui, &c., (about) 1866. (B. M. Pl. 289.)

S. ornata (adorned).* *l.* ovate, acuminate, at length cordate at base, freely spotted with silvery-grey on a deep green ground, the marking being confined to the spaces between the veins; petioles prickly at back. Branches angular, armed with short prickles. Native place unknown, 1865. A handsomely-marked, greenhouse species. See Fig. 497. (I. H. 439.) SYN. *S. macrophylla maculata.*

S. Pseudo-China (false China). *fl.* greenish; peduncles two to four times the length of the petioles. July. *l.* 3in. to 5in. long, ovate-cordate, or on the branchlets ovate-oblong, cuspidate-pointed, green on both sides, often rough-ciliated, thin, becoming firm in texture. Stems and branches unarmed, or with a very few weak prickles. North America, 1739.

S. quadrangularis (four-angled). A synonym of *S. rotundifolia.*

S. rotundifolia (round-leaved).* *fl.* greenish; peduncles flattened, rather longer than the pedicels, few-flowered. June. *fr.* blue-black, globular. *l.* thin, ovate or round-ovate, entire, 2in. to 4in. long, abruptly pointed, mostly rounded or slightly cordate at base. Stem climbing high, armed with scattered prickles. North America. (T. S. M. 610.) SYN. *S. quadrangularis* (W. D. B. 109).

S. salicifolia variegata (variegated Willow-leaved). *l.* elliptic-lanceolate, finely marbled with white between the ribs, and thus appearing to be marked with four irregularly-margined, white bands, very ornamental. Branches angular, rarely sub-terete, armed with recurved prickles. Para, 1867. Greenhouse. (L. H. 521, under name of *S. longifolia foliis-variegatis.*)

S. Shuttleworthii (Shuttleworth's). *l.* large, cordate, acuminate, deep green, marked with confluent blotches of silvery-grey, the young ones purplish at back; petioles curiously deflexed at base. Columbia, 1877. A free-growing, stove climber.

S. tamnoides (Black Bryony-leaved). A synonym of *S. Bona-nox.*

SMITHIA (named in honour of Sir James Edward Smith, 1759-1828, F.R.S. and P.L.S., founder of the Linnean Society, author of "English Botany," "Flora Britannica," and other works). ORD. *Leguminosæ.* A genus comprising about a score species of stove herbs, sub-shrubs, or shrubs, inhabiting tropical Asia and Eastern Africa. Flowers mostly yellow, rarely purple or violet streaked with yellow, often in unilateral, axillary racemes; calyx deeply cut, the lobes connate in two lips; standard sub-orbicular, shortly clawed; keel incurved, obtuse, or slightly rostrate; bracts and bracteoles scarious or striated, persistent. Pods folded back into the calyx. Leaves impari- or abruptly pinnate; leaflets small, often falcate, exstipellate; stipules membranous or scarious, persistent. *S. purpurea,* the only species which calls for description in this work, requires culture similar to **Mimosa** (which *see*).

S. purpurea (purple). *fl.* purple, the round standard and the wings marked with white spots; bracts ovate, ciliated; peduncles bristly, equalling the leaves. Summer. *l.*, leaflets oblong, long-apiculate, ciliated; stipules adnate, ovate, terminated by a bristle. Stem erect, branched, glabrous. *h.* 6in. to 12in. East Indies, 1848. Annual. (B. M. 4283.)

SMOKE. Except in towns, or in the immediate neighbourhood of smelting-furnaces and coke-ovens, or (though to a less degree) of brickworks and limekilns, Smoke can scarcely be regarded as hurtful to gardens and plantations. In and around large cities, particularly in the

Smoke—*continued.*

manufacturing districts of England and Scotland, the air is charged with soot, in either a fine or a coarse state of division. The soot consists chiefly of carbon, and along with it small quantities of various compounds (empyreumatic oils, &c.) formed in the combustion of the fuel. All are familiar with the black coating that settles on everything from an atmosphere polluted with Smoke. This coating upon leaves and twigs is injurious by clogging the stomata, or small openings through which air passes into the tissues; and it also hinders the work of the leaves by shutting out part of the light that they should receive to keep them in health, and to fit them to supply the plants with food. This source of danger can be overcome by keeping the plants clean by syringing, or by washing those that are so delicate as to require special care, and so valuable as to deserve the labour. Nor is the danger so frequent as might be imagined from the prevalence of a black, sooty deposit on plants, even those in greenhouses, since these deposits are far oftener composed of Fungi (*Fumago,* &c.) than of soot. Moreover, the presence of Carbonic Acid (the most abundant product of combustion) in the atmosphere is necessary to green plants, of which it is a most important food.

The real danger to plants in the vicinity of towns and smelting-works arises from the presence, in the gases formed during combustion, of poisonous products, of which Sulphurous Acid gas is by far the worst. Its presence is due to the existence of sulphur in the coal as an impurity. Hardly any coal is free from sulphur; and its compound, Iron Sulphide or Pyrites, may often be seen as a yellow, shining coat on the smooth sides of lumps of coal. The leaves of plants show traces of poisoning by Sulphurous Acid gas, when the proportion in the atmosphere does not exceed 1 in 1,000,000 parts, if exposed to this mixture for a considerable time; and Stockhardt found that Clover and grasses showed its effects when exposed twice, for two hours each time, to 1 part in 40,000, the leaves becoming brown at the tips, and the plants withering. But the experiments are usually carried on with plants in confined air, under bell glasses; and it must be remembered that, in the open air, plants are seldom exposed to the *continuous* action of the gas, and that the danger is, therefore, considerably less than the amount of gas occasionally contained in the air would indicate. It has been found that the leaves of plants poisoned with Sulphurous Acid gas show, at first, translucent spots between the veins. These spots become dull green, and then brown, dry, and shrivelled. When water is copiously supplied to the roots, drops of water often stand along both sides of the larger veins of the leaves. Along the veins extend green borders, which form a network in the brown, dry leaves. The cells of the green parts retain abundance of fluid. This green network is an indication of the cause of harm; and chemical analysis of the leaves affords a proof of the presence of sulphur in excess, and confirms the indication given by the colour. The leaves of Conifers become dull green at the tip; then this changes into brown-red, sharply separated from the green parts below. But in these leaves the effect is very similar to that of frost, or other causes of injury; and the only certain indication is given by chemical analysis, proving the presence of excess of sulphur. Conifers are found to suffer most severely from the action of the gas, as their leaves are less readily renewed. Herbs, under similar exposure, suffer more than ordinary deciduous trees. Plants are injured less by exposure to the gas during darkness, and least of all during winter, when growth has ceased for a time. Limekilns are not so hurtful as smelting-furnaces, since the gas combines with the lime, and forms Sulphate of Lime, which prevents its escape in a hurtful form. Another injurious substance in the

Smoke—*continued.*

fumes from some works, is Hydrochloric Acid gas, which is emitted during the formation of various chemical products. The only thorough remedy is the stoppage of the emission of the gases; but the harm may be lessened by restricting these injurious processes to winter, or to the night-time if they must go on in summer.

SMOKE-PLANT. *See* **Rhus Cotinus.**

SMOKE-WOOD. A common name for *Clematis Vitalba.*

SMOOTH FLOWER. A popular name for *Leianthus longifolius*, and other species.

SMOOTH-FRUITED HORSE CHESTNUT. *See* **Pavia.**

SMUT. The name given to a group of Fungi which grow among the tissues of the stamens, ovaries, and leaves of many plants, but especially infest the Cereals (*e.g.*, Barley and Oats) and other grasses. The scientific name of the group is *Ustilaginei* (from *ustus*, scorched), and refers to the scorched appearance of ears of Corn, or of other parts of plants, infested with the Fungi. The name Smut also refers to the dirty, sooty aspect of the Fungi. In the early stages, they consist of interwoven masses of mycelium, the threads of which bear numerous spores, either in a group on the tip of each thread, or singly on slender branches along their sides, near the tips. The spores vary a good deal in the different genera, some being one-celled, others made up of cells grouped together to form a rounded mass, each cell in which may be fit to produce a new plant, or only the central cell may be fit to do so, the outer ones being sterile. In most of the species, the spores are more or less deeply coloured, and in the typical Smuts they are dark brown individually, and sooty-black when in masses. The outer tissues of the host-plant are usually torn open by the pressure of the ripening spores, and the dark, powdery masses of spores are displayed and become very conspicuous. It does not fall within the scope of this work to discuss the Smuts that attack grasses, serious though their effects frequently are. Few flowering plants are liable to much injury from the Fungi of this group. *Ustilago violacea* destroys the anthers of a good many species of *Caryophylleæ, e.g., Dianthus Carthusianorum, D. superbus, Saponaria officinalis*, various species of *Silene*, &c.; the spores are one-celled, roundish, and pale violet. *Sorosporium* has the spores formed each of a mass of several equal cells. *S. Saponariæ* distorts the anthers of the same *Caryophylleæ* as *U. violacea*; *S. hyalinum* consumes the seeds of *Astragalus glycyphyllus*, of a few other *Leguminosæ*, and of *Convolvulus sepium*; *S. primulicolum* lives on young seeds of *Primula elatior, P. farinosa*, and *P. vulgaris*, destroying them, but showing no sign on the exterior of the ovaries. *Urocystis* has spores like those of *Sorosporium* except in the outer cells being smaller and sterile, the inner larger and fertile; *U. Violæ* causes large swellings in the stalks and blades of the leaves, and in the stolons, of *Viola odorata*; *U. Anemones* causes similar swellings on various species of *Anemone* and other *Ranunculaceæ*; *U. sorospoides* covers the leaves of *Thalictrum minus* with dark patches of spores.

Remedies cannot be employed owing to the Fungi growing inside the tissues of the host-plants. The affected plants ought to be removed and burned, to prevent the spread of the disease.

SMYRNIUM (the old Greek name, used by Dioscorides, and derived from *smyrna*, one of the names of myrrh; alluding to the odour of the plants). Alexanders. ORD. *Umbelliferæ.* A small genus (six or seven species) of erect, glabrous, hardy, biennial herbs, natives of Europe, North Africa, and Western Asia. Flowers yellow, polygamous, in compound, many-rayed umbels.

Smyrnium—*continued.*

Radical and lower leaves ternato-pinnately dissected; upper ones undivided, or having fewer segments. Before the introduction of Celery, *S. Olusatrum* was cultivated as a salad plant, under the names of Black Pot-herb, Common Alexanders or Alisanders, and Horse Parsley; it somewhat resembles Celery in flavour, but is stronger and less agreeable. None of the species have any horticultural value.

SNAILS. What has been already said in regard to **Slugs** (which *see*) is equally applicable to Snails, except that the latter animals possess large and conspicuous spiral shells, into which they withdraw at the approach of cold or dry weather, and in which they protect themselves by means of opercula of firm texture with which they close the opening of the shell. Thus guarded against injury from without, they may remain motionless for long periods, even for several years. As regards the nature of the tongue and of the foot, their general habits, and also the methods of remedy, and of prevention of attacks, it is needless to repeat what is said under **Slugs.** Snails do not, however, commit such ravages as the latter creatures. It is necessary to break the shells to permit the remedies employed to reach their bodies. Hand-picking is probably the most certain cure. The injurious Snails chiefly belong to the genus *Helix*; but many of the smaller species, even in this genus, do no appreciable harm. The larger and more conspicuous kinds are: *Helix pomatia*, the "Apple Snail," whose shell reaches 2in. in breadth, and is dull yellowish-white, with spiral lines of brown. This Snail is found only in the South of England, and is said to have been introduced by the Romans, by whom it was eaten, after having been fed up for some time, to bring it into good condition for the table. *H. aspera*, the Common Snail, is usually common in gardens. The shell may reach 1¼in. in diameter; it is yellowish-brown, with five dark brown lines or narrow bands running round it; the epidermis is rough, and wrinkled. *H. hortensis* also occurs in gardens, but is commoner throughout Britain (along with *H. nemoralis*, of which it is often regarded as a variety) beside hedgerows or on banks, among tangled vegetation. Both forms vary much in colour of the shells, from white or yellow to brown, with from one to five dark brown lines or narrow bands around them; or the shells may show no markings. The chief difference between the two forms is that *H. hortensis* has the out-turned lip pale, while *H. nemoralis* has it dark; each is about 1in. broad. The other species need not be separately mentioned, as they do little harm in gardens, or do not live there. Snails are preyed on by the larvæ of Glowworms and by other kinds of beetles, *e.g., Drilus, Staphylinus*, &c. Thrushes, blackbirds, and various other birds, feed greedily on them; and one of the best methods, when practicable, for reducing their numbers is to turn a flock of ducks into the place to be cleared. For other remedies, *see* **Slugs.**

SNAKE GOURD. *See* **Trichosanthes anguina.**

SNAKE-MILLIPEDES. A name applied, by John Curtis, to a genus of **Millipedes** (which *see*) named *Julus*, because of their resemblance in form to miniature snakes. Several of the species are of very frequent occurrence; and, at times, do a good deal of harm to Strawberries and other fleshy fruits on the ground, as well as to roots of plants.

SNAKE-PLANT. A common name for *Dracunculus vulgaris.*

SNAKE-ROOT. A popular name for many plants which possess reputed curative properties for snake-bites. The following are the most important: *Actæa racemosa, Aristolochia Serpentaria, Casearia ulmifolia, Chiococca angustifolia, Liatris scariosa* and *L. squarrosa, Ophiorrhiza Mangora*, and *Polygala Senega.*

SNAKE'S BEARD. *See* **Ophiopogon.**

SNAKE'S HEAD. *See* **Fritillaria Meleagris** and **Iris tuberosa.**

SNAKE'S-MOUTH ORCHIS. *See* **Pogonia ophioglossoides.**

SNAKE'S TONGUE. A common name for **Ophioglossum** (which *see*).

SNAKEWEED. *See* **Polygonum Bistorta.**

SNAKE-WOOD. *See* **Cecropia** and **Strychnos colubrina.**

SNAP BEETLE. *See* **Wireworms.**

SNAPDRAGON. *See* **Antirrhinum.**

SNAPWEED. A name applied to various species of *Impatiens.*

SNOUT MOTHS. A small group of slender-bodied Moths, that take their popular name from the long palpi, or feelers, projecting like a snout from the front of the head. The form of the insect when the wings are closed is very characteristic, the wings lying almost flat, and giving an outline like the Greek letter *delta* (Δ), whence the scientific name *Deltoides* has been conferred on the group. None of the species are large, most of them scarcely exceeding 1in. in spread of wings; while only one British species (*Hypena proboscidalis*) reaches 1½in. across the wings. This species feeds on Nettles, and may therefore be regarded as useful. Very few of the insects in the group are injurious to garden produce; in fact, the only one that deserves special notice as hurtful is the Buttoned Snout (*H. rostralis*), which, in the larval state, feeds on the Hop, and is very common in the Hop-growing districts. The moth measures a little over 1in. across the fore wings, which are greyish-brown, with two dark brown cross-lines and a pale grey line near the hind margin, ending in a dark brown streak at the tip of each wing. In the middle of each fore wing is a raised tuft of scales. The hind wings are grey. The larva is slender, and pale green, with a narrow, dark green line down the back, and a broken, white line above the feet on each side; the head is brown. When the larva is touched, it jerks itself rapidly about. It forms a cocoon among dead leaves or other shelter on the soil, becomes a pupa, and comes out as a moth after about three weeks. The larvæ may be removed from Hops by beating the plants over an umbrella or sheet.

SNOW. In most cases, Snow may be regarded as beneficial in its effects on garden produce, inasmuch as it forms a very efficient protection against injury from frost. Plants under a few inches of loose snow suffer little harm from frosts that would prove fatal to hardier species without this protection. But Snow may also act hurtfully in spring by destroying seedlings. This occurs, in most cases, when a slight thaw is followed by frost, so as to cause the formation of a continuous surface-crust of ice. If this continues for some days, the young plants are much weakened, or are killed, owing to the necessary air being cut off; and, when the Snow is all melted, only the decaying remains show where they had been.

Evergreen trees are liable to serious injury from the pressure of Snow, which tears off or distorts their branches. Deciduous-leaved trees are much less liable to suffer in this way, as Snow can seldom adhere to the bare branches in quantity sufficient to cause harm. The danger is greatest during snowfalls in calm weather, with the temperature about the freezing-point, as the Snow then adheres to the branches and leaves, and collects into heavy masses. In windy weather, and at temperatures too low for the Snow to ball together, the risk is comparatively slight. The trees that suffer most from injuries due to the weight of Snow are Spruces,

Snow—*continued.*

and others with horizontal branches, the leaves on which are so arranged as to afford a considerable surface for the Snow to lie on.

Remedies. It is scarcely possible to do anything to save seedlings from injury, beyond breaking the ice-crust as much as possible. Trees may be saved from being injured by the weight of Snow on the branches, if it is shaken off with long poles while loose. If a branch is entirely broken off, or so far as to hang down, the surface of the wound on the tree should be smoothed so far as possible, and covered with tar or any other convenient application, to prevent the entrance of moisture, or of parasites. If the injury is detected as the branch is beginning to yield, the Snow should be shaken off, and the branch supported by stays of any convenient kind.

SNOWBALL-TREE. *See* **Viburnum Opulus.**

SNOW BERRY. *See* **Chiococca** and **Symphoricarpus racemosus.**

SNOWDROP. *See* **Galanthus nivalis.**

SNOWDROP-TREE. *See* **Halesia.**

SNOWDROP-TREE, AFRICAN. *See* **Royena lucida.**

SNOWFLAKE. *See* **Leucoium.**

SNOW FLOWER. A name applied to *Chionanthus.*

SNOW GLORY. A common name for *Chionodoxa Luciliæ.*

SNOW IN SUMMER. A popular name for *Cerastium tomentosum.*

SNOW PEAR. *See* **Pyrus sinensis.**

SNOW-TREE. *See* **Pyrus nivalis.**

SNOWY FLY (*Aleyrodes proletella*). A small, four-winged Fly, that lives on the lower leaves of Cabbages, often in such numbers as to cause the leaves to show yellow or pale patches, or even to wither and die, so that the plants are much injured where the attack is severe. The Snowy Fly is nearly related to Aphides, and resembles them in general form and in size, the length not exceeding $\frac{1}{16}$in., and the spread of wings being about $\frac{1}{8}$in. It has, however, no honey-tubes, and is snowy-white in colour, owing to its being covered with a white, powdery coat. Below this coat the head and the thorax are black, marked with yellow; the abdomen is yellow or rosy-red, and the front wings are marked with a dusky spot near the middle. On the head is a beak, as in Aphides, which is inserted into the leaf, and serves for sucking in the sap. The female insects place their eggs in patches on the leaves; and the young, on emerging, scatter themselves over the leaves, which they pierce with their suckers, and to which they adhere closely. Each then becomes covered with a white scale, bearing two yellow spots; and below this it becomes a pale pupa, with red eyes. The whole metamorphosis occupies nearly four weeks.

Remedies. The most reliable is to remove and burn infested leaves. A remedy less to be trusted is throwing them into a liquid manure tank, or into a farmyard, where the trampling under foot destroys the larvæ and pupæ. Dusting the plants with soot or ashes, and syringing with tobacco-water, have also been recommended.

SOAP. As a preventive against, or as a cure for, the depredations of insects on cultivated plants, Soap is often used, either in the form of suds, or along with other remedies (*e.g.*, Carbolic Acid and Paraffin), which it helps to keep mixed with the water. Where Onions or roots, such as Carrots and Radishes, are suffering from the inroads of larvæ, great benefit is experienced

Soap—*continued.*

from watering the plants freely with soapsuds twice or thrice. It is recommended also to mix the soapsuds either with equal parts of gas-water, or with gas-tar in quantity such as to cause a strong smell, sufficient to keep the insects from laying eggs on the plants. Soap-boilers' waste, *i.e.*, the coarse, alkaline solutions that are formed as waste products in making Soap, have been found of service when used instead of the above mixture. Soapsuds are also used against caterpillars on Gooseberries and other plants, being applied by means of a syringe. When Soap is employed to cause insecticides to mix more readily with water, it is well to use Soft Soap, as being stronger, and better suited to effect the end in view. With its aid, a good many substances may be kept much more uniformly diffused in water than could otherwise be done. Carbolic Acid is prepared thus, in the proportion of one part of acid to ten of Soap, with which it is very thoroughly mixed. The mixture is then diluted to the desired strength; and the solution is sprinkled with a watering-pot on plants infested with Green Fly or larvæ, &c. Soft Soap is also used in combination with tobacco-water, sulphuret of lime, sulphur, or other substances, as a wash for the trunks of Apple-trees infested with American Blight; for walls, to destroy the Red Spider; and against such other injurious creatures as live on the bark or in crevices of the walls on which trees are trained. In all such mixtures, the substances used along with the Soap should be thoroughly mixed with it, and water should then be added till the mixture can be painted on the bark or wall; or more water may be used, and the fluid may then be rubbed well in with a stiff brush, or may be thrown from a syringe upon the places to be cleansed.

SOAP BARK TREE. *See* **Quillaja Saponaria.**

SOAP BERRY TREE. *See* **Sapindus.**

SOAP BULB. A common name for *Chlorogalum pomeridianum.*

SOAPERS' ASHES. These are occasionally used as manure for plants. They consist largely of carbonate of lime, mixed with sulphuret and sulphite of lime, and a small quantity of sand and other rubbish. While fresh, they injure plants, and ought therefore to be left exposed to the atmosphere for some time. If this is done, they absorb oxygen, and the sulphurets and sulphites become converted into the sulphate of lime, or gypsum; so that at last the effect, when they are employed as manure, is but little different from that which results from the use of the same quantity of a mixture of carbonate of lime (chalk) and sulphate of lime (gypsum). The value of Soapers' Ashes as manure is not great.

SOAP PODS. A popular name for the pods of several species of *Cæsalpinieæ.*

SOAPWORT. *See* **Saponaria officinalis.**

SOBOLES. Shoots, especially those from the ground.

SOBOLIFEROUS. Bearing vigorous, lithe shoots.

SOBRALIA (named in honour of Don F. M. Sobral, a Spanish botanist). ORD. *Orchideæ.* About thirty species have been referred to this genus; they are tall, leafy, not tuberous, free-growing, stove, terrestrial orchids, natives of the Andes of tropical America, from Peru to Mexico. Flowers large and showy, few in a terminal, axillary raceme, sometimes reduced to one flower; sepals unequal, erect, connate at base; petals similar or broader; lip erect from the base of the column, around which its lateral lobes are folded, the limb spreading, concave, undulated or fimbriate, undivided or two-lobed; column elongated, slightly incurved, semi-terete; bracts appressed. Leaves scattered, coriaceous, plicate-veined, sessile in the sheaths. The best-known species are here described. "The East Indian or Mexican house will either of them suit these plants, which thrive best in pots of large size, potted in rough, fibrous peat . . . . which should overlie about 3in. of drainage. An abundant supply of water at the roots in the growing season is essential to their well-being, but afterwards much less will suffice. The stems grow up in thick tufts; and when the plants get too large, they should be turned out of the pot, and divided into several pieces, each of which will soon grow and make a flowering plant. The genus is far too much neglected by orchid-growers" (B. S. Williams).

Sobralia—*continued.*

S. Cattleya (Cattleya-like).* *fl.* resembling those of a Cattleya; sepals and petals purplish-brown; lip purplish, with three yellow, crested keels, forming a sharp angle by its lateral lobes overlapping the column; inflorescences several, lateral. *l.* oblong, acuminate, plaited, shining. Stem stout. Columbia, 1877. A plant of great beauty.

S. chlorantha (yellow-flowered). *fl.* yellow, whole-coloured, fully 4in. long, sessile; lip obovate, the disk striated, the margins undulated, a pair of deep lamellæ extending from the base to the apex. June. *l.* very fleshy, hardly plicate, loosely striated, oblong; upper ones changed to ovate, cucullate bracts. *h.* 1ft. Brazil, 1852. (B. M. 4682; F. d. S. 840.)

S. decora (comely). "This differs from *S. sessilis*, not only in being perfectly free from the black hairiness characterising that species, but also in being a smaller plant, with a truly cuneate lip, in having whitish flowers with a rose-coloured lip, and the petals overlaying the sepals, so that the back of the former answers to the face of the latter" (Lindley). Guatemala, 1836. (B. M. 4570 and L. J. F. 104, under name of *S. sessilis.*)

S. dichotoma (dichotomous).* *fl.* white outside, violet within, sometimes whitish-rose with a rose and purple lip, or the whole deep red, fleshy; lip cucullate, three-lobed, the lateral segments entire, the middle one emarginate, crisped, crested-lacerate at apex; racemes lateral, drooping, dichotomous, flexuous, many-flowered. March. *l.* hard, plicate, acuminate, narrowed at base. Stems 6ft. to 20ft. high, resembling bamboos. Peru. A grand species.

S. fragrans (fragrant). *fl.* in pairs, 1½in. long, deliciously scented; sepals externally dirty purplish-green, keeled; petals pale yellow, thin, flat, lanceolate; lips of a brighter yellow, the middle lobe deeply fringed and furnished with nine lacerated crests. July. *l.* very smooth, rather fleshy, perfectly naked, with a short, keeled sheath. Stem two-edged, scarcely 1ft. high. New Grenada, 1854. (B. M. 4882.)

S. leucoxantha (whitish-yellow). *fl.*, sepals white, recurved, oblong-ligulate; petals white, rather shorter and broader; lip white outside, deep golden-yellow, flushed with orange in the throat and disk, passing off to white at the edge, oblong-flabellate, convolute at base, the expanded front portion bilobed and crenulate; bracts of the spathe scarious, spotted with brown. August. *l.* plicate, cuneate-oblong, long-acuminate, the sheaths warted. Stems 1ft. or more high. Costa Rica.

S. Liliastrum (Star-Lily). *fl.* white, veined with yellow, large, pendulous; racemes terminal, distichous, many-flowered, with spathaceous bracts. July and August. *l.* lanceolate, very acute, striated, sheathing at base. Stems 8ft. to 10ft. high. British Guiana, Brazil, 1840. (L. S. O. 29.) SYN. *Epidendrum Liliastrum.*

S. L. rosea (rose-coloured). *fl.*, petals and lip of a rich rose-colour, the latter veined with white.

S. macrantha (large-flowered).* *fl.* beautiful rich purple and crimson, aromatic, 6in. across; sepals oblong; petals broader, crisped in the upper part; lip folded round the column at base, very broad and bilobed at the apex, wavy at the edges, having a pale yellowish spot in the centre; racemes short. Summer. *l.* ovate, acuminate, plicate. Stems 6ft. to 8ft. high. Mexico and Guatemala, 1842. The finest species of the genus. (B. M. 4446; F. d. S. 669; P. M. B. xiv. 241.)

S. m. albida (whitish). *fl.* of a very pale rose-colour. (G. C. 1871, p. 906.)

S. m. nana (dwarf). *fl.* smaller than in the type; lip dark violet, yellow at the base. A dwarf variety.

S. m. purpurea (purple). *fl.* of a rich purple.

S. m. splendens (splendid). *fl.* darker than those of the type, but not so large. June to August. 1846. A charming variety. "WOOLLEY'S" variety is a very dwarf form of this, producing splendid flowers in June and July.

S. rosea (rose-coloured).* *fl.* very large; sepals and petals dark mauve; lip crimson, with a white centre, very open; raceme short, the rachis flexuous; bracts boat-shaped, large. *l.* ovate, acuminate. Stems stout, 4ft. to 6ft. high. Peru and New Grenada. A fine species; the spikes have four flowers, all opening at once. SYN. *S. Ruckeri* (R. X. O. i. 43; W. S. O. iii. 19).

S. Ruckeri (Rucker's). A synonym of *S. rosea.*

S. sessilis (sessile-flowered). *fl.* deep rose-colour, the lower half of the lip tinged with yellow, solitary, sessile; lip rhomboid-oblong, bilamellate at base; bracts none or only a few, leafy at apex. December. *l.* beneath (as well as the stems) covered with dark pubescence. British Guiana, 1840. (B. R. 841, 17.)

Sobralia—*continued.*

S. suaveolens (sweet-smelling). *fl.* yellowish-white, richly perfumed; lip white, brown on the disk of the front lobe, the keels yellow. Central America, 1878. This species is very similar in habit to *S. decora*.

S. violacea (violet). *fl.* pale violet, larger than those of *S. decora*; lip convolute, not unlike that of a Cattleya; bracts imbricated, somewhat leafy. July. *l.* hard, lanceolate, deeply plicate; sheaths slightly warted. New Grenada. Plant larger than *S. decora*. There is a variety having white flowers, with a yellow disk to the lip.

S. xantholeuca (yellowish-white). *fl.* large and handsome, deflexed; sepals and petals pale yellow, the former oblong-lanceolate, the latter broader and wavy at the edges; lip longer, deeper yellow, much frilled, emarginate. *l.* lanceolate, acuminate, plaited, the sheaths dotted with brown. Native country unknown. (Gn. xxii. 366; W. O. A. vi. 250.)

SOCRATEA (named after the philosopher Socrates, the greatest of the Greeks). ORD. *Palmæ*. A small genus (three to five species) of stove, unarmed palms, natives of North Brazil and Columbia. Spathes five to eight, deciduous, the upper ones complete; spadices solitary, horn-like and recurved before flowering. Fruit ellipsoid or oblong-obovoid, one or rarely two-seeded. Leaves few, terminal, equally pinnatisect; segments oblique, cuneate-flabellate, deeply laciniate, the laciniæ narrow, sinuate-toothed. Only one species calls for mention here. Its aërial roots are studded with small spines, used by the Indians as a Cassava grater. For culture, *see* **Iriartea.**

S. exorhiza (rooting outwards). Zanona Palm. *fl.*, spathes five or six, deciduous; spadix 1½ft. long, spreading when flowering, pendulous in fruit. *fr.* yellowish or yellowish-green, scarcely fleshy, ovate-elliptic, eight to twelve lines long. *l.* 12ft. to 20ft. long; pinnæ oblique, sub-trapezoid, sinuate-toothed, flat; petioles cylindrical, convolute at base. Trunk 60ft to 100ft. high. Aërial roots eight to twenty or more, emerging 6ft. from the ground. Guiana, Amazons River, 1849. SYN. *Iriartea exorhiza*.

SODA. A substance composed of the alkaline metal Sodium, combined with Oxygen, together with a certain amount of water, called Water of Hydration. Sodium is one of the most widely-diffused elements; and its numerous compounds are almost all readily soluble in water. It is very difficult to get entirely clear of the element, even in the chemical laboratory, and it is impossible to do so in soils: hence, plants are constantly supplied with it in solution from the soil, and it is found in the ashes of all plants. Experimental cultivation of plants from which it is, to the utmost, withheld, proves that it is not indispensable to any plant; though it has been asserted that Wheat, Oats, and Barley require an appreciable trace of Sodium to allow them to form perfect seeds. It has also been stated, as a result of experimental cultivation, that Sodium may, in part, functionally replace Potassium in plants; but there seems reason to believe that Sodium produces very little, if any, effect on the health of plants, though indispensable in the nourishment of animals, including man.

SODIUM CHLORIDE. *See* **Salt.**

SOFT GRASS. *See* **Holcus.**

SOIL. The comparatively soft and loose upper layer of the earth's crust, upon which plants depend for their nourishment. The various kinds of Soils, and their modes of origin, will be found described below. Soils should be carefully examined as regards their composition and physical properties, in order to ascertain their capabilities for cultivation, the kinds of plants for which they are naturally best fitted, and the means by which they can be rendered more fertile.

ANALYSIS. Soils may be examined in the following way, as regards their general composition; and much valuable information can be obtained from such an analysis: The Soil is first thoroughly dried at 212deg. Fahr., and a given weight, say ½lb., is boiled in distilled water till the particles of which it is made up fall thoroughly apart. The substances in the soil that are soluble in pure water will be dissolved in this way; and

Soil—*continued.*

the solution is carefully filtered through paper into a vessel, and kept for chemical analysis. The solid residue is carefully washed twice or thrice with distilled water, on a filter, to remove the whole of the soluble substances, and the washings are added to the solution. The residue is then thoroughly dried at 212deg. Fahr., and weighed; and the loss, as compared with the previous weight of ½lb., gives the amount of substances in the soil that are soluble in pure water. The solid material is then again washed, and the water is poured off, carrying with it the lighter particles. This is repeated till only the sand and gravel are left behind: these are dried and separated, by sifting through gauze. The washings, also, are collected and dried. The gravel, sand, and fine particles, which form the clay or mud of soils, are weighed separately, and the relative weight of each is thus determined. Each is then examined with a good lens, and the proportions of pure quartz sand (silica), mica, volcanic rocks, limestone, or other minerals, are noted. This examination is facilitated if a little Hydrochloric Acid (Spirit of Salt) is poured over the material under examination; since quartz sand remains unchanged, limestone is dissolved with the formation of bubbles of Carbonic Acid gas, ironstone is slowly dissolved, and the acid turns brown, and gives the very characteristic test for iron by turning blue when a solution of Prussiate of Potash is mixed with it. Other minerals in Soils give less conspicuous results with the acid. The chemical analysis of the portion soluble in water, and the complete analysis of the solid residue, require a considerable knowledge of chemistry for the attainment of success, and should be entrusted to a professional analyst.

The amount of organic matter, *i.e.*, remains of animals and of plants, in Soils, very greatly affects their value. The fresh Soil must be thoroughly dried, as already stated, to drive off the water as completely as possible. A given weight of it is then burned in a platinum dish, over a lamp, in the open air; and the burning is continued till all the blackness is got rid of, *i.e.*, till the Carbon is entirely burned away. The residue is then carefully weighed again, and the loss of weight represents the amount of organic matter destroyed. It is desirable to ascertain the conditions in which the latter is present in the fresh Soil; but exact analysis demands more experience of chemical manipulation than is usually met with, except among chemists. Organic matter is usually present as Humic and Ulmic Acids (along with small quantities of some other organic acids), and insoluble vegetable matter, including often a good deal of tannin. Nitrates, also, are formed from organic remains.

Those who desire fuller details on the methods of analysis, will find them in most works on Agricultural Chemistry, such as Johnston's "Analysis of Soils," or Johnston and Cameron's "Elements of Agricultural Chemistry and Geology."

PHYSICAL PROPERTIES. Not less valuable than the knowledge of the chemical composition of Soils, is that of certain properties grouped under the term heading this paragraph. Of these, the chief are the capacity for absorbing and retaining water, various chemical compounds, and heat; the density and power of cohesion of the particles of Soil, and the mode of shrinkage in dry weather. These vary greatly, according to the composition of the Soil; but their general characters may now be indicated.

Absorption and Retention of Water. This is a quality of great importance in fitting the Soil to supply the moisture required by plants. Soils absorb rain; though when the rainfall is very heavy, they cannot absorb more than a part, and the rest flows off the surface into streams. The capacity for absorption of rain-water, and for keeping it stored within reach of the roots of plants,

Soil—*continued.*

varies much in Soils, according to their composition and the size of the particles of which they are made up. Sandy Soils rapidly absorb the water; but they allow it to drain away almost as quickly; so that plants growing in sand are liable to suffer from drought. Fine sand is about twice as retentive of water as coarse. Clay retains twice or thrice as much as sand. Vegetable earth, or humus, absorbs and retains about twice or thrice as much as clay, and becomes about two and a-half or three times as heavy when soaked in water as when dry. The more retentive Soils lose less by evaporation than do the others. Almost all Soils are more or less full of water, in the liquid form, at a few feet below the surface, the depth varying with the nature of the Soil and Subsoil and with the season of the year and the climate. This subterranean water is brought within reach of the roots of plants by what is known as *capillary attraction*, the water rising in the fine crevices between and in the particles of the Soil. If the subterranean water is stagnant near the surface, substances are apt to be formed in the Soil that are injurious to plants, and that thus diminish its fertility. Drainage is usually necessary in clays and peat Soils, to prevent water from accumulating and doing harm in this way.

Certain Soils also have the property of absorbing a good deal of vapour from the atmosphere, and condensing it in their particles, the amount increasing in proportion to the moistness of the air. Experiments have shown that humus can absorb about half its own weight of water from air saturated with vapour; and clays absorb one-tenth to one-fifth of their own weight; but quartz sand absorbs little, if any, moisture in that way. This source of moisture becomes less productive as the temperature rises. During the night, and in cold weather, it is probable that Soils absorb a good deal of moisture from the atmosphere; but when the air is warmer and drier than the soil, the latter loses water by evaporation, and what is lost in this way is replaced from below by capillary attraction. Evaporation cools the surface from which it is going on; hence, wet land is colder than that which is well-drained. Humus gives up least by evaporation, and quartz sand most, of all Soils under similar conditions.

The Power of Absorbing and Retaining Chemical Compounds is one possessed to a greater or less extent by all Soils, and is of the utmost importance in the nutrition of plants. If solutions of various kinds (*e.g.*, of Potassic Nitrate or Ammonium Nitrate, or of Phosphates of Potassium, Calcium, &c.) are allowed to trickle through a moderately thick layer of Soil, it is found that the water flowing off contains little of these substances for a time; but at last the Soil becomes saturated with them, and allows the solution to pass through unchanged. By this property of retaining certain compounds, Soils are enabled to store up soluble manures, as well as Ammonia and Nitrates from the atmosphere, and various substances formed in the changes due to weathering of the rocks and Soils; and from this store plants can draw, as they need these substances in their food. Owing to this process, filtering impure water through, or over, a sufficient extent of earth is a very efficient mode of removing impurities, and is frequently resorted to for purifying sewage-water before discharging it into streams.

The Capacity for Absorbing and Retaining Heat varies with colour and texture, with the amount of moisture in, and of evaporation from, the Soil, and with the angle of exposure to the rays of the sun, direct or reflected. Of course, the actual temperature depends also upon the amount of protection afforded by buildings or other objects in the neighbourhood.

Bottom-heat is of great use in stimulating the action of roots, but in Great Britain it can be given only in

Soil—*continued.*

hotbeds or hothouses. Exposure to the sun's rays is, therefore, the only source of warmth that need be discussed here. The more directly the rays fall, the greater is their effect. Evaporation keeps down the temperature, and it has been found that wet Soils are usually from 10deg. to 15deg. Fahr. colder than dry ones of the same composition. Hence, draining wet Soils renders them warmer, and hastens the ripening of the crops on them. Dark grey Soils absorb most heat; next come black Soils, then brown and dark red. Pale sands, marls, and clays absorb least. The temperature of the Soil exercises a marked influence on the growth of plants, since they suffer if the buds and leaves are stimulated by a warm atmosphere while the soil is too cold to permit of the roots supplying the necessary sap to the other organs.

The Density and Power of Cohesion of the particles of Soils, and the *Mode of Shrinkage*, are of interest and importance chiefly on account of their influence on the capacities of Soils for moisture, chemical substances, and heat. Pure sands show little cohesion, and change little in bulk or form during dry weather. Clays are very coherent, and may lose as much as one-fifth of their bulk by shrinkage during droughts; and peaty Soils shrink even more than clays. Cracks form in these Soils to a considerable depth, and allow evaporation to continue; and roots are broken across, and exposed to the air in the cracks, or are crushed by the shrinkage.

Soils can frequently be much improved by a judicious mixture with others: *e.g.*, sand should be added to clay; clay or peat to sand; lime, clay, and sand to peat.

ORIGIN. All Soils are formed in one or other of two ways, either from the weathering and breaking down of rocks, or from the decay of plants or animals, and most of them are produced more or less in both ways; though the former has been the source of by far the greater bulk of all Soils except peat. In some localities, it is not difficult to recognise that the Soils are of the same composition as the rocks on which they lie, and that they are formed by the action of the weather in breaking up the rocks and reducing them to fragments. In course of time, also, the decay of successive generations of plants gives origin to an admixture of humus in almost all Soils. But, in most parts of Great Britain, the Soils are different in composition from the rocks on which they lie, and must have been brought into their present situations from a greater or less distance. That this should be the case in valleys, is easily understood, for the Soil on the slopes is constantly being carried down by showers and streams, and spread over the lower ground. This also occurs on fields or meadows along rivers in the lowlands liable to be overflowed, as the finer particles of mud in the water are deposited on the flooded ground, where free from the action of currents. Frost splits pieces of stone from exposed rocks and cliffs, and causes them to roll down the slopes, and it is also a powerful agent in reducing rocks and stones into the finer particles of which Soils are composed. But a layer of a few inches of earth will protect the rocks very greatly, if not entirely, from the action of the air, rain, and frost; and these agents are not sufficient to account for the amount and depth of soil, or for the relations of the soil to the subjacent rocks, now prevalent over the country, especially in Scotland and in the northern half of England. A far more powerful force than any now existing in Britain was, however, at work during a comparatively recent geological period. This was *ice*, which, for a long time, covered the land (much as Greenland is covered now) with a continuous sheet. Formed and renewed on the higher tracts of country, it spread down the valleys, and over all but the highest peaks, extended over the lowlands of Scotland and Northern England, and met ice

Soil—*continued.*

pushing its way down from the Norwegian mountains into the ocean. Probably, the present German Ocean was then blocked with ice; and ice from Scotland extended over the Isle of Man, the North of Ireland, and the Hebrides, and a considerable distance into the Atlantic Ocean. As the ice pressed down from the hills, its enormous weight ground down the looser and more prominent rocks, and pushed the Soil, loose rocks, and stones, before it in the direction in which it travelled, until they were deposited in hollows, protected behind hills or ridges. As the climate became warmer, the ice diminished, till it did not reach the sea; then it gradually receded in the lowlands, till it became restricted to the mountain valleys; and, finally, it disappeared completely, even from our mountains, leaving its traces only in markings on rocks over which it had passed, and in the mounds of stones and earth (moraines) left behind as the glaciers receded. The Soils formed before the Ice Age were pushed by the ice from the situations in which they had originated, over rocks of a different kind, and were so mixed together as to frequently render it very difficult to trace their sources; but, by this mixing, the Soils have often been much improved—clays, sands, and limestones being mingled, so as to combine their valuable properties.

Vegetable Earths, or *Humus*, are formed in great part of the remains of plants, and, to a slight extent, of animals; and along with these is a varying amount of Soils of purely mineral origin (as described above). Cultivated Soil usually contains a good deal of Humus, which gives a darker hue the greater the amount of it in the Soil. When the organisms decay in comparatively dry earth, the resulting Soil is known as Mould; and any Soil containing more than 6 per cent. of organic remains, is called a Vegetable Mould; but the proportion of organic matter is often much higher. These Moulds are known as sandy, clayey, or loamy, according to the nature of the mineral Soil mixed with them.

Peat is the name given to Vegetable Earths formed in the temperate zones, under water, or in swamps saturated with water. It is frequently from 5ft. to 6ft. deep, and in some Irish Peat-bogs it even reaches 40ft. in depth. It is formed by the decay of aquatic and marsh plants. Peat-bogs seem frequently to have originated in forests, where fallen trees obstructed the drainage of the surface-water. The ground became saturated with water, but the surface of the swamps then, as now, bore a luxuriant vegetation of marsh-plants and Bog-mosses (*Sphagna*), which decayed below, and formed new Peat, while they continued to grow upwards. The Peat-mosses, so plentiful in many districts, have been formed chiefly, if not almost wholly, since the Ice Age; they seem to be now wasting away from natural causes, apart from human agency, more rapidly than they are renewed. Newly-formed Peat yields in general only 1 or 2 per cent. of mineral substances derived from the plants, and is brown, light, porous, and fibrous. Deeper down, the Peat becomes much darker and denser, and gradually loses all traces of its vegetable origin: the ash may reach as much as from 10 to 30 per cent. of its weight. Peat-bogs are not adapted for cultivation in their natural condition, although they are the favourite habitat of certain plants, such as many of the Heaths, Rhododendrons, and allied plants, and although Peat is a most useful material in gardening operations, being employed in the Soils prepared for the cultivation of many plants from the Cape of Good Hope and Australia, and many Monocotyledons. Peat is also an excellent material for steeping in liquid farmyard manure, either in tanks, or as litter, to prevent the manure running to waste, the Peat being afterwards used as manure, alone or in composts.

To render Peat-bogs fertile, the excess of water must be drained off, and lime, sand, and clay added. The effect

Soil—*continued.*

of this treatment is that the Soil is warmed, and the hurtful organic acids are destroyed by the lime; while the lime, sand, and clay, together, render the Soil more open and pervious to gases, and prevent stagnation of water in it. By such treatment, Peat-bogs may, in time, be converted into fields or gardens, capable of yielding a good return; but the labour and expense incurred in improvements of this kind are usually considerable.

CLASSIFICATION. The chief kinds of Soils have been incidentally mentioned above, but it will be well to recount their more important differences. They may be classed according to their composition as follows:

Sandy Soils, with not less than 80 per cent. of pure quartz sand; such as may be met with among the dunes or sandhills, along our coasts. These contain little nourishment for plants, are very liable to suffer from drought, have little cohesion, and are blown about by the winds; they produce light, but early, crops. Sandy Soils can be improved by the addition of clay, and lime in the form of marl or of chalk. Turnips often do well in the better class of Sandy Soils; and, in wet years, these Soils yield a very fair produce.

Clay Soils, chiefly composed of clay (Aluminum Silicate), result from the breaking down of felspars in granites and in rocks of similar composition. They are heavy, dense, and very coherent, and are very retentive of water; but the water is apt to stagnate in them, and to render them late and cold by the amount of evaporation from the surface, near which it remains, there being no crevices for it to pass down. In droughts, plants on Clay Soils are apt to suffer, as roots cannot penetrate into stiff clays, or obtain water from the Subsoil. These Soils contain abundance of mineral food for plants; but it is rendered unavailable by their stiff texture. When this is corrected, by the addition of sand, lime, ashes, or suitable manures, and when the stagnant water is removed, by drainage, clays become very fertile.

Calcareous Soils contain above 20 per cent. of Carbonate of Lime, in the form of *chalk*, or mixed with clay to form *marls*. These may be dry and friable, or (*e.g.*, marl) may approach the clays in texture. In productiveness they vary greatly. They are less frequent than the two soils already described.

Peaty Soils have been discussed above at sufficient length; as have been also the methods of improving them.

Vegetable Moulds (*Humus*) vary much in percentages of organic matter contained in them. They belong to the more fertile kinds of Soils, and are retentive of water.

Gravelly Soils may belong to any one of the first three classes, seldom to the fourth. The term applies only to the presence of gravel or stones in Soils, without reference to their composition.

Loamy Soils are intimate mixtures of all the first four, in which the clay is under 50 per cent., and the lime under 5 per cent. Loams are productive and excellent Soils, being easily cultivated and fertile.

SOJA. Included under **Glycine** (which *see*).

SOLANACEÆ. A rather large natural order of herbs, erect or climbing shrubs, or rarely trees, mostly inhabiting the warmer regions of the globe. Flowers hermaphrodite, regular or slightly irregular; calyx five (rarely four, six, or seven) parted, toothed, or lobed, gamosepalous; corolla gamopetalous, tubular, funnel, salver, or bell-shaped, or rotate; limb five (rarely four, six, or seven) parted or lobed, the lobes equal or obscurely bilabiate; stamens alternating with the corolla segments, affixed to the tube; inflorescence usually cymose. Fruit capsular or baccate. Leaves alternate, the upper ones usually twin, in one instance whorled, entire, toothed, lobed or dissected. Of all the plants comprised in this order, the most useful to man is the

Solanaceæ—*continued.*

Potato (*Solanum tuberosum*). Tobacco, the manufactured leaves of several species of *Nicotiana*, principally *N. Tabacum*, is also a highly-important article of commerce. Among other products may be mentioned: Chilies, the berries of *Capsicum annuum*; Cayenne Pepper, the ground fruits of a sub-woody species of *Capsicum*; the Tomato or Love Apple (*Lycopersicum esculentum*), widely cultivated; and the Brinjal, Aubergine, or Egg Plant (*Solanum Melongena*). The principal medicinal properties of *Solanaceæ* are: Belladonna, Henbane, and Stramonium. The fruits of *Solanum quitense*, and other species, are edible. About sixty-six genera and 1200 species are included under *Solanaceæ*. Examples: *Cestrum*, *Lycopersicum*, *Nicotiana*, *Petunia*, *Physalis*, and *Solanum*.

SOLANDRA (named in honour of Daniel Charles Solander, LL.D., F.R.S., 1736-1782, a Swede, disciple of Linnæus, and fellow-traveller with Sir Joseph Banks and Captain Cook). ORD. *Solanaceæ*. A small genus (about four species) of tall-climbing, stove shrubs, natives of tropical America. Flowers large; calyx long-tubular, two to five-cleft at apex; corolla funnel-shaped, with an ample, campanulate throat, and a limb of four broad lobes; stamens five, declinate above the middle; pedicels solitary, thick. Berries globose, pulpy. Leaves entire, coriaceous, shining. The species are very handsome subjects when in flower. If allowed abundance of space and moisture, they grow rapidly, but produce no blossoms. In order to avoid this, insert the plants in loamy soil, and encourage them to grow rapidly at first by giving plenty of water; then withhold water altogether until the leaves begin to drop off from drought, and an abundance of flowers will be the result. Propagation may be readily effected by cuttings, inserted in mould or tan. If small flowering plants are desired, the cuttings should be taken from flowering shoots.

S. grandiflora (large-flowered).* Peach-coloured Trumpet Flower. *fl.*, calyx 2in. to 3½in. long, three or four-cleft; corolla greenish-white, 7in. to 10in. long, the lobes undulate-crenate. March and April. *fr.* greenish, ovoid-globose, of a sweet, sub-acid flavour. *l.* elliptic or elliptic-oblong, 2½in. to 5in. long. *h.* 15ft. Jamaica, 1781. (B. M. 1874.)

S. guttata (spotted). *fl.* erect, terminal; corolla pale yellow, marked with purple spots in the throat, large, funnel-shaped, the lobes crispately crenated, spreading. March. *l.* broadly elliptic-oblong, 3in. to 6in. long, acute, downy beneath. *h.* 10ft. Mexico, 1830. (B. R. 1551.)

S. lævis (smooth). *fl.* fragrant; calyx 4in. long, tubular, two-lipped at the extremity; corolla greenish-cream-colour, white at the limb, nearly 1ft. long, slender below, bell-shaped above, the limb spreading, of five singularly crisped and waved lobes; peduncles thick, ½in. long. November. *l.* alternate, oblong-oval or somewhat obovate, acute, paler beneath, small in proportion. Branches spreading, 2ft. long. South America, 1846. (B. M. 4345.)

S. longiflora (long-flowered). *fl.*, calyx about 3in. long; corolla white, with a purplish tinge, 1ft. long, the lobes undulately toothed. November. *fr.* 1½in. in diameter. *l.* elliptic-, lanceolate-, or obovate-oblong, 2½in. to 4in. long. *h.* 6ft. Jamaica, 1846.

S. viridiflora (green-flowered).* *fl.* green, terminal, solitary, pedunculate; calyx segments five, acute; corolla drooping, the segments elongated and revolute. May to July. *l.* elliptic-oblong, attenuated at both ends, acuminate, glabrous. *h.* 2ft. to 3ft. Brazil, 1815. Deciduous. (B. M. 1948.) *Dissochroma viridiflora* is now the correct name of this plant.

SOLANUM (the old Latin name, used by Pliny). Nightshade. Including *Aquartia* and *Nycterium*. ORD. *Solanaceæ*. An immense genus (upwards of 900 species have been described, but not more than 700 are distinct as such) of spiny or unarmed, stove, greenhouse, or hardy shrubs, herbs, or small trees, of very variable habit; they are mostly confined to the hotter parts of the globe, and are especially abundant in America. Flowers yellow, white, violet, or purplish; calyx campanulate or spreading, five or ten-toothed, lobed, or parted, rarely four-parted; corolla tube very shortly rotate or rarely broadly campanulate, the limb five (rarely four or six) lobed, plaited in bud; stamens five, rarely

Solanum—*continued.*

four or six, affixed to the throat; filaments very short; cymes dichotomous or racemose, lateral or terminal. Berry globose or elongated. Leaves alternate or sub-opposite in equal pairs, entire, lobed, or pinnatisect. The most important species in the genus is *S. tuberosum*, which has been exhaustively treated in this work under its common name, **Potato.** For the most recent conclusions respecting this species and the origin of the Potato, see the papers published in vol. xxvi. of the "Gardeners' Chronicle." *S. Melongena* furnishes the fruit known as **Aubergine** (which *see*), and the berries of several other species are edible. *S. Dulcamara* (Bittersweet) and *S. nigrum* are British plants. Solanums succeed in almost any rich, loamy soil. The annuals, and a large proportion of the other species, may be readily raised from seeds. Those which bear tubers may be increased thereby; and the stove and greenhouse shrubby plants may generally be propagated from cuttings, inserted, when young, in a warm propagating frame. For sub-tropical gardening, *S. marginatum*, *S. robustum*, and *S. Warscewiczii* are invaluable; *S. Capsicastrum* and *S. Pseudocapsicum* are popular plants for greenhouse decoration when covered with their bright-coloured berries. Out of twenty tuber-bearing species which have been named, J. G. Baker (in the "Journal of the Linnean Society," vol. xx.) is of opinion that "six, *viz.*: *S. tuberosum*, *S. Maglia*, *S. Commersoni*, *S. cardiophyllum*, *S. Jamesii*, and *S. oxycarpum*, possess a fair claim to be considered as distinct species in a broad sense." A large number of the species have been introduced to cultivation, and many of them are highly deserving of a place in the garden, on account of their ornamental appearance. Except where otherwise indicated, those described below are shrubs. All flower in summer.

S. acanthodes (spiny).* *fl.*, calyx hemispherical, bristly; corolla pale blue-purple, nearly flat, lobed to about the middle, 2½in. in diameter, the margins waved; cymes lateral, scorpioid, six to ten-flowered. *l.* 1ft. or more long, ovate or obovate-oblong, pinnatifidly lobed to the middle or lower, deeply two-lobed at base; lobes horizontal, sinuate, sub-acute; midrib and horizontal nerves orange-red, and, as well as the petioles, prickly. Stem and branches dark green and bright orange, prickly. *h.* 3ft. to 6ft. Brazil, 1863. Stove. (B. M. 6283.)

S. æthiopicum (African). *fl.*, calyx leafy, five to seven-cleft; corolla white, deeply five to seven-cleft, the segments triangular-oblong; racemes few-flowered, drooping. *fr.* red, large, globose, edible. *l.* ovate-lanceolate, repand-angled, solitary or twin, petiolate, 5in. long, very unequal at base, acuminate, paler beneath. Stem 1ft. to 2ft. high. Africa, 1597. Hardy annual.

S. amazonium (Amazon). *fl.*, calyx five-cleft; corolla blue, with five yellow rays on the outside, five-cleft, 2in. in diameter; pedicels one-flowered; peduncles 1in. long; racemes cymose, terminal or lateral, nearly 2in. long. *l.* solitary, above twin, rarely ternate, petiolate, spreading, 4in. to 5in. long; lower ones larger, sometimes 6in. long, sparsely prickly on the nerves and petioles. Stem unarmed. *h.* 3ft. to 4ft. Mexico, 1800. Stove. (B. R. 71; L. B. C. 352.) SYN. *Nycterium amazonicum* (B. M. 1801).

S. Anguivi (Anguivi). A synonym of *S. indicum*.

S. anthropophagorum (man-eating). Cannibal's Tomato. *fl.* small; calyx five-lobed; corolla white, rotate, pubescent; pedicels few, drooping. *fr.* red, resembling tomatoes, obscurely two-lobed, nippled at apex. *l.* glabrous, ovate, acuminate, entire or (the lower ones) angularly lobed, long-petiolate. *h.* 6ft. Fiji. Stove. The berries of this species were formerly eaten by the natives with human flesh. (B. M. 5424.)

S. asarifolium (Asarum-leaved). *fl.*, calyx truncately five-toothed; corolla whitish, rotate, five-lobed; peduncles sub-axillary, solitary, one-flowered. *l.* twin, very unequal, membranous, glabrous; one petiolate, ovate-cordate, rounded at apex, entire, slightly ciliated; the other sessile, minute, orbicular. Stem creeping, branched. Venezuela, 1870. Stove perennial. (Ref. B. 255.)

S. atropurpureum (dark purple).* *fl.*, calyx tinged with purple, deeply five-cleft; corolla diluted with yellow, somewhat five-parted, the segments acuminate, four lines long; racemes lateral, six to eight-flowered, nearly 1in. long. *fr.* white, at length yellow. *l.* 6in. to 7in. long, long-petiolate, unequally sub-cordate, five to seven-parted, armed with robust prickles nearly 1in. long. Stem erect, branched, dark blood-colour; prickles unequal, dark purple at base. *h.* several feet. Brazil, 1870. Greenhouse sub-shrub. (Ref. B. 207.)

S. aviculare. Bird Solanum; Kangaroo Apple. *fl.* few, in short, loose, pedunculate racemes; calyx lobes short; corolla violet, ¾in.

Solanum—*continued.*

to 1in. in diameter, very shortly and broadly lobed. *fr.* green or yellow, rather large. *l.* lanceolate, acute or rarely almost obtuse, mostly entire on old specimens, often pinnatifid, the larger ones 6in. to 10in. long. *h.* 5ft. to 6ft. Australia and New Zealand, 1772. An erect, greenhouse shrub or sub-shrub. (B. M. 349, under name of *S. laciniatum.*)

S. Balbisii (Balbis'). A synonym of *S. sisymbriifolium.*

S. betaceum (Beet-leaved). A synonym of *Cyphomandra betacea.*

S. campanulatum (bell-shaped). *fl.*, calyx four to five lines long; corolla violet or blue, broadly campanulate or almost rotate, 1in. in diameter, very shortly lobed; racemes loose, lateral. *fr.* ⅔in. to 1in. in diameter. *l.* petiolate, ovate, sinuate-lobed, with short, broad lobes, or rarely more deeply pinnatifid, 2in. to 4in. long. *h.* 2ft. to 3ft. Australia, 1836. A prickly, greenhouse herb or under-shrub. (B. M. 3672.)

S. Capsicastrum (Star Capsicum).* *fl.* similar to those of *S. Pseudo-capsicum*, disposed in short racemes nearly opposite the leaves. *fr.* scarlet, about the size of a hazel nut. *l.* twin, one being much smaller, all penninerved, entire or slightly repand; the larger one oblong-lanceolate, 1½in. to 2in. long; the smaller one lanceolate or obovate. Stem branched. *h.* 1ft. to 2ft. Brazil. Greenhouse sub-shrub, very ornamental when in fruit. (F. d. S. 1242.) There is a variegated form of this species.

S. cardiophyllum (heart-leaved). *fl.*, calyx cyathiform, five-toothed; corolla cream-coloured, five-parted, the segments triangular, flat, acuminate, at length revolute; cymes few-flowered, terminal. *l.* auriculate, pinnate; leaflets two or three pairs, not interrupted, somewhat round-cordate, slightly fleshy. *h.* 3ft. Mexico, 1846. Hardy, tuberous perennial; at present not in cultivation in Britain. (J. H. S. iii. 71.)

S. ciliatum (ciliated). *fl.* nodding; calyx deeply five-cleft; corolla white, five-parted, nine to eleven lines across; racemes short and few-flowered; peduncles solitary or twin. *fr.* pure scarlet, globular, nearly as large as a Tangierine orange. *l.* petiolate, ovate-oblong, sinuate-lobed; lobes usually five, sometimes three or seven, ovate, acute, entire or repand, prickly. Stem 1ft. to 1½ft. high, straight, branched, very prickly. Porto Rico, 1871. Greenhouse annual. (F. M. 521; F. d. S. 1988.)

S. Commersoni (Commerson's). *fl.* in loose, compound cymes; calyx teeth as long as the tube; corolla pale lilac or white, ¼in. to ½in. long. *l.* sometimes, but not always, pseudo-stipitate, 5in. to 6in. long; leaflets five to nine, oblong, acute or often obtuse, the terminal one much the longest, the lowest pair much dwarfed; petioles 1in. to 1½in. long. Rootstock bearing copious large tubers. *h.* 2ft. Brazil, 1822. Hardy perennial. (R. G. 1885, p. 368, and R. H. 1883, pp. 498, 499, under name of *S. Ohrondii.*)

S. corniculatum (horned). A garden synonym of *S. cornigerum.*

S. cornigerum (horn-bearing). *fl.* erect; calyx small; corolla violet, star-shaped, three or four times longer than the calyx; racemes terminal, loose, few-flowered. *fr.* yellow, pendent, ovate-conical, bearing five blunt, conical, horn-like appendages. *l.*, cauline ones 1½in. long, trisected, the segments marcescent, caducous; those of the branches sessile, cordate, ovate-oblong, acuminate, nearly triangular. Brazil, 1868. Stove climber. (R. H. 1868, 33.) SYN. *S. corniculatum* (of gardens).

S. crinitum (hairy). *fl.*, calyx five-parted; corolla white, 1⅝in. to 2in. in diameter; racemes lateral, cymose, nearly simple, 4in. long. *fr.* silky-villous, seven lines long. *l.* petiolate, broadly ovate, 1ft. to 2ft. long, unequally cordate, undulated, sinuate-lobed, hairy, purple-veined; lobes short, slightly acute, tomentose-woolly on both sides, yellowish-green and unarmed above, whiter and prickly beneath. Stem and branches armed with many prickles. *h.* 4ft. to 5ft. Cayenne. Greenhouse.

S. crispum (curled).* Potato-tree. *fl.* fragrant; calyx five-toothed; corolla bluish-purple, five-cleft, eight to ten lines in diameter; corymbs 3in. to 3½in. long, terminal, at length lateral. *fr.* yellowish-white, as large as peas. *l.* simple, undivided, entire or slightly repand, petiolate, ovate, ovate-lanceolate, or sub-cordate, 3in. to 4in. long, often cuspidate at apex, loosely crisped on the margins. Stem sub-shrubby, broadly diffuse; branches herbaceous. Chili, 1824. A very showy, hardy plant, growing 12ft. to 14ft. high against a wall. (B. M. 3795; B. R. 1516; L. B. C. 1959; P. M. B. iii. 1.)

S. c. ligustrinum (Privet-leaved). *fl.* in glabrous, few-flowered corymbs. *l.* sub-cordate, 1½in. long, highly glabrous. Branches terete, glabrous, green. Chili, 1831. (L. B. C. 1963, under name of *S. ligustrinum.*)

S. cyananthum (blue-flowered). *fl.*, calyx much spreading, five-parted; corolla blue, 2in. to 2½in. in diameter; peduncles 2in. long, whitish, prickly, hairy; racemes nearly 4in. long, about five-flowered. *l.* petiolate, cordate, ovate-elliptic, undulated, 14in. long, almost unarmed, sinuate-repand or sinuate-lobed; petioles 2½in. to 3in. long, sub-terete, villous. Branches stellate, villous, whitish, prickly, and hairy. *h.* 6ft. Brazil, 1880. Greenhouse.

S. Dulcamara. Bittersweet; Dulcamara; Felon-wood; Woody Nightshade. *fl.* many, drooping; calyx lobes obtuse; corolla purple or white, ½in. in diameter, the lobes revolute; cymes panicled, leaf-opposed or lateral. *fr.* red, rarely yellow-green, ½in. in diameter. *l.* ovate or cordate, sometimes three to five-parted, 1in. to 3in. long, acuminate. Stem 4ft. to 6ft. long,

Solanum—*continued.*

trailing. Europe (Britain), &c. Perennial. (B. M. Pl. 190; F. D. 607; Sy. En. B. 930.)

S. D. marinum (sea-loving). *l.* fleshy. Stem prostrate, branched. South Coast.

S. esculentum (edible). A synonym of *S. Melongena.*

S. etuberosum (non-tuberous). A form of *S. tuberosum.*

S. Fontanesianum (Fontaines'). *fl.*, calyx urceolate, five-cleft; corolla yellow, scarcely regular, nine to ten lines in diameter, semi-five-cleft, the segments cuspidate, woolly-villous outside; racemes three or four-flowered, nearly 2in. long. *l.* petiolate, sub-pinnatipartite, 6in. long; lobes unequally sinuate, ½in. to 2½in. long, hairy and prickly on both sides; prickles yellow, 2in. to 5in. long. Stem rigid. *h.* 4ft. Mexico, 1813. Hardy annual, armed with recurved prickles. (B. R. 177.)

S. fragrans (fragrant). A synonym of *Cyphomandra betacea.*

S. giganteum (gigantic).* *fl.*, corolla blue, ⅔in. in diameter, the tube nearly as long as the lobes; cymes terminal, densely many-flowered, stellately white-woolly. *l.* oblong, cuneate at both ends, 8in. long, undulated. Stem thick, soft, prickly, stellately white-woolly. *h.* 10ft. to 25ft. India, 1792. Plant sub-arboreous. Greenhouse. (B. M. 1921.)

S. glaucophyllum (glaucous-leaved). A garden synonym of *S. glaucum.*

S. glaucum (glaucous). *fl.*, calyx cyathiform, five-cleft; corolla blue, star-shaped, ten to eleven lines in diameter; corymbs terminal, at length lateral, 3in. long, sub-trichotomous. *l.* very shortly petiolate, lanceolate-oblong, acuminate, 5in. to 6in. long, glaucous, white-margined; petioles whitish, wing-margined. Stem erect, simple, smooth, glaucous. *h.* 6ft. Buenos Ayres, 1880. Stove perennial. (B. H. iii. p. 165.) SYN. *S. glaucophyllum* (of gardens).

S. Hookerianum (Hooker's). *fl.*, calyx of four deep segments, the lower evidently formed of two, cohering at the margin; corolla blue, eight to sixteen lines in diameter, five-cleft, the lobes shorter than the tube; cymes corymbiform, one or few-flowered. *fr.* dark blue. *l.* lanceolate or elliptic-oblong, rather blunt, 1½in. to 4in. long, tapering into the short petioles, entire. Stem unarmed. *h.* 4ft. to 7ft. Mexico, 1793. A very variable, stove shrub. (B. M. 2708, under name of *S. coriaceum.*)

S. hybridum (hybrid). *fl.*, corolla pale blue, five-cleft, seven to eight lines across; cymes or umbels sessile or shortly pedunculate. All the year. *l.* persistent, ovate-cordate, sinuate-repand, 3½in. to 4in. long, including the petioles, stellate-tomentose, almost unarmed. Stems suffruticose. *h.* 2ft. Mexico, &c. Stove.

S. indicum (Indian). *fl.*, calyx lobes ⅛in. long; corolla blue, ⅔in. to 1in. in diameter, the lobes broadly triangular, tomentose outside; racemes lateral, many-flowered; peduncles short, extra-axillary. *fr.* yellow. *l.* ovate, sinuate or lobed, 3in. to 6in. long, stellately woolly beneath, prickly on the nerves; petioles 1in. long. *h.* 1ft. to 6ft. India, China, and Malaya, 1732. A very prickly, much-branched, stove under-shrub. SYN. *S. Anguivi* (H. E. F. 199).

S. Jamesii (James'). *fl.*, corolla white, the segments lanceolate-deltoid, equalling the tube; cymes few-flowered. *fr.* globose. *l.* distinctly petiolate; leaflets nine to eleven, oblong-lanceolate, acuminate. Stem short, slender. Tubers minute. *h.* 9in. South-western United States and Mexico, 1884. Hardy perennial. (B. M. 6766.)

S. jasminoides (Jasmine-like).* *fl.*, calyx short, five-toothed; corolla bluish-white, nine to ten lines in diameter, deeply five-cleft, spreading; racemes 1in. to 1½in. long, about ten-flowered. *l.* petiolate, mostly sub-cordate, ovate-acuminate, entire or sub-repand, rounded at base, 1⅔in. long, sometimes two to five-cleft or parted, and 2in. to 2½in. long. Stems many, 3ft. to 4ft. long, twiggy, sarmentose, leafy. South America, 1838. Greenhouse, deciduous twiner. (B. R. xxxiii. 33; P. M. B. viii. 5.) The variety *foliis variegatis* has leaves blotched with creamy-white.

S. laciniatum (torn). A synonym of *S. aviculare.*

S. lanceolatum (lanceolate-leaved). *fl.*, calyx five-cleft; corolla blue, 1in. in diameter, semi-five-cleft, the segments ovate-triangular; cymes, or cymose corymbs, 1in. to 4in. long, unarmed. *fr.* orange-coloured, erect, globose. *l.* lanceolate or oblong-lanceolate, 6in. to 9in. long, acuminate, acute, unequal at base, obscurely greenish-canescent above; petioles five to ten lines long. Stem 6ft. or more high, with a few short, straight prickles. Mexico, 1800. Stove. (B. M. 2173.)

S. lycioides Iodasterum (Lycium-like). *fl.*, calyx five-parted; corolla angular, violet, yellow within, with a five-rayed, dark purple star; peduncles filiform, bearing one flower, axillary. *l.* elliptic, obovate-elliptic, or ovate-lanceolate, entire, cuneate at base, shortly decurrent into the petioles, paler beneath, ½in. to 1½in. long. Branches numerous, spiny. *h.* 4ft. Peru, 1791. Stove. (B. R. xxxii. 25, under name of *S. lycioides.*)

S. macrantherum (large-anthered). *fl.* sub-corymbose, long-pedicellate; calyx sinuately five lobed; corolla violet, with a five-parted limb 1in. to 1½in. in diameter; anthers brown, thick, ½in. long; panicle solitary, 5in. to 9in. long. *fr.* red, globose, 1in. in diameter. *l.* long-petiolate, ovate, acuminate, rounded or sub-cordate at base, entire or sub-repand, hairy-pubescent, 3in. to 5in. long. Stems climbing, woody. Mexico, 1838. Greenhouse. (B. R. xxvii. 7.)

Solanum—*continued.*

S. macranthum (large-flowered). A synonym of *S. maroniense.*

S. Maglia (Maglia). *fl.*, corolla white, the segments short, deltoid; style elongated. *l.* distinctly petiolate; leaflets few-jugate, ovate, acute. Tubers large. *h.* 1ft. to 1½ft. Chili and Peru, 1862. Hardy perennial. This is, in all probability, merely a geographical form of *S. tuberosum.* (B. M. 6756.)

S. marginatum (margined).* *fl.*, calyx five or six-cleft, prickly or unarmed; corolla white, with a small, purple centre, five or six-cleft, outside, as well as the peduncles and pedicels, snowy-tomentose. *fr.* yellow, pendulous, globose, 1in. or more in diameter. *l.* sub-cordate, sinuate-lobed, prickly on both sides, snowy-tomentose beneath, whitish-margined above. Stem erect, 3ft. to 4ft. high, snowy-tomentose, prickly. Abyssinia, 1775. Greenhouse. (B. M. 1928.)

S. maroniense (Maroni River).* *fl.*, calyx ⅛in. to ¾in. in diameter, unarmed or prickly; corolla bluish-violet, five or six-cleft, 1½in. to 2½in. in diameter, the segments acute; racemes cymose, 1in. to 5in. long, seven to twelve-flowered. *l.* solitary, sub-sessile, attenuated into winged petioles 10in. to 15in. long, cuneate, ovate, lanceolate, or lanceolate-elliptic, sinuate-angled or sinuate-lobed; lobes nine or ten, entire or sub-repand, prominently prickly on the veins. Stem prickly, branched at apex. *h.* 6ft. to 14ft. Brazil. Stove. See Fig. 498. (B. M. 4138, under name of *S. macranthum.*)

Solanum—*continued.*

S. Melongena (Melongena).* Bringall or Brinjal; Egg Plant; Jew's Apple; Mad Apple. *fl.*, calyx lobes ¼in. to ⅓in. long; corolla blue, 1in. to 1¼in. in diameter, shortly lobed, hairy on the plaits without; cymes lateral, few-flowered. *fr.* white, yellow, or dark purple, ellipsoid or elongated, 1in. to 9in. in diameter, edible. *l.* ovate, sinuate or lobed, 3in. to 6in. long, stellately woolly beneath, prickly, rarely all unarmed. *h.* 2ft. to 8ft. Native country uncertain (widely cultivated throughout the tropics and frequently semi-naturalised). 1597. Greenhouse annual. SYN. *S. esculentum.* There are several garden varieties of this; the following are two of the best: CHINESE BRINJAL, fruit white, long, very juicy, less fibrous than other sorts; LARGE PURPLE, fruit sometimes as much as 6in. or 7in. long, and 1ft in circumference. *See also* **Aubergine.**

FIG. 498. SOLANUM MARONIENSE.

S. myrtifolium (Myrtle-leaved). *fl.*, corolla blue, five-parted, the segments broadly ovate, undulated, acute; racemes short, lateral. *l.* lanceolate, glabrous, attenuated at both ends. Branches terete, green. *h.* 3ft. South America. Greenhouse. (L. B. C. 1431.)

S. nigrum (black). Hound Berry. *fl.* few, drooping; calyx lobes obtuse; corolla white, ⅛in. to ⅜in. in diameter, the lobes ciliated, recurved; cymes lateral, umbellate. *fr.* black, yellow, or red, ⅓in. in diameter. *l.* rhomboid-ovate, narrowed into the petioles, 1in. to 3in. long, sinuate or toothed Stem erect, 6in. to 2ft. high, usually tubercled. Europe (Britain), &c. Annual. (Sy. En. B. 931.)

Solanum—*continued.*

S. n. miniatum (scarlet). *fr.* scarlet. *l.* toothed. Kent. (Sy. En. B. 932.)

S. oxycarpum (sharp-fruited). *fl.* borne in loose, few-flowered cymes. *fr.* ellipsoid, cuspidate. *l.* distinctly petiolate; leaflets nine to eleven, oblong-lanceolate, acuminate. Stem short and slender. Tubers minute. Mountains of Central Mexico. Hardy perennial. This species is not in cultivation.

S. platanifolium (Plane-leaved). *fl.*, calyx small, five-cleft, prickly in fruit; corolla diluted with violet, seven to eight lines in diameter, five-parted; peduncles usually one-flowered, unarmed. *fr.* beautifully variegated with green and white, at length yellow, 1¼in. in diameter. *l.* petiolate, five-lobed, 3½in. long; lobes irregularly incised, ciliated on the margins. Stem hairy, sparsely prickly. *h.* 3ft. to 4ft. Northern South America. Greenhouse sub-shrub. (B. M. 2618.)

S. Pseudo-capsicum (false Capsicum).* Jerusalem Cherry. *fl.*, corolla white, five-parted; pedicels solitary or few in a lateral fascicle; common peduncle scarcely any. *fr.* scarlet, rarely yellow, globose, about ½in. in diameter. *l.* oblanceolate or oblong, often repand, bright green and shining, narrowed at base into short petioles. *h.* 4ft. Madeira, 1596. Greenhouse. A few handsome hybrids have been raised from this species.

S. P.-c. rigidum (rigid). *fr.* bright orange-colour, globose. A fine, ornamental, garden hybrid. 1868.

S. P.-c. Weatherilli (Weatherill's). *fr.* bright orange-coloured, oval, pointed. *l.* strongly-veined, wavy. 1868. A handsome shrub.

S. pyracanthum (fire-thorn).* *fl.*, calyx five-cleft; corolla bluish-violet, 1in. in diameter, the segments cuspidate; peduncles 2in. long; racemes cymose, simple, many-flowered. *l.* petiolate, oblong, acuminate, acute, unequal at base, 5in. to 6in. long, pinnatifid, the lobes ovate-lanceolate. Stem 3ft. to 6ft. high, terete, leafy. Madagascar, 1789. A handsome, greenhouse, prickly sub-shrub. (B. M. 2547; F. d. S. 2411.)

S. quercifolium (Oak-leaved). *fl.*, calyx five-toothed; corolla violet, four or five times longer than the calyx, five-cleft, the segments acute; racemes terminal, at length lateral, 2in. to 3in. long. *l.* imparipinnatifid, slightly glabrous, five to seven-lobed, decurrent into the petioles, slightly ciliated, 2½in. to 3½in. long; lobes ovate-oblong, obtuse or acute. Stem 3ft. to 5ft. high, scabrous. *h.* 2ft. Peru, 1787. Hardy perennial.

S. quitense (Quito). *fl.* pedicellate, clustered; calyx seven to eight lines in diameter, five-cleft; corolla violet and woolly outside, white within, nearly 1in. in diameter, five-parted; racemes 1in. long, four or five-flowered. *fr.* globose, the size of a small orange, fragrant, edible. *l.* cordate, sinuate-angled; lower ones 1ft. to 1½ft. long; upper ones in pairs, one being much smaller; all softly woolly; petioles very hairy, 2in. to 2½in. long, ochraceous-rufescent. Stem suffruticose. *h.* 4ft. to 6ft. Peru. Greenhouse. (B. M. 2739.)

S. robustum (robust).* *fl.* clustered; calyx cyathiform, nearly five-parted; corolla white, ovoid, 1in. in diameter, five-parted; racemes 1½in. to 2in. long. *fr.* globose, hairy, ferruginous-orange. *l.* ovate-elliptic, acuminate, sinuate-lobed, green and tomentose-velvety above, ochraceous-ferruginous and woolly-tomentose beneath, prickly on both sides, 5in. to 8in. or more long. Branches robust, densely woolly-tomentose, prickly. *h.* 2ft. to 4ft. Brazil, 1868. A vigorous and highly ornate, sub-arborescent plant, well suited for the sub-tropical garden. (Ref. B. 37.)

S. runcinatum (runcinate). *fl.* drooping, forming a compound cyme; corolla bright purple, with five blood-red, starry points radiating from the base of the lobes; anthers yellow, large. *l.* alternate, 2in. to 3in. long, with five or nine undulated segments, waved at the margins, but otherwise entire. Stems procumbent or ascending. *h.* 2ft. Chili, 1839. Greenhouse perennial. (B. M. 5222; S. B. F. G. ser. ii. 177.)

S. saponaceum (soapy). *fl.*, calyx cyathiform, deeply five-cleft; corolla bluish-violet or white, thrice as long as the calyx, deeply five-cleft, §in. in diameter; corymbs 2in. to 3in. long and broad, dichotomous. *fr.* orange, globose. *l.* petiolate, linear-oblong, entire. Stem erect, branched, with a few remote prickles. *h.* 4ft. Peru, 1825. Greenhouse. (B. M. 2697.)

S. Seaforthianum (Seaforth's).* *fl.*, calyx small, minutely five-toothed; corolla pale red or lilac, deeply five-cleft, scarcely ½in. long; pedicels diverging; cymes peduncled, lateral, paniculate. *fr.* yellowish-red, globose. *l.* petiolate, ovate, pointed, entire, 1½in. to 3in. long; lower ones (or all) pinnately divided, the terminal segment 1½in. to 3in. long. West Indies, 1804. Stove trailer. (A. B. R. 504; B. M. 1982; B. R. 969; L. B. C. 971; B. M. 5823, under name of *S. venustum.*)

S. sisymbriifolium (Sisymbrium-leaved).* *fl.* racemose; calyx five-parted; corolla light blue or white, 1in. or more in diameter, five-lobed. *fr.* red, globose. *l.* deeply pinnatifid; lobes oblong, sinuate, or even again somewhat pinnatifid. *h.* 4ft. Brazil, North America (escaped from cultivation). Greenhouse annual or perennial, much armed with prickles. (B. M. 2568; B. 49, under name of *S. Balbisii*; B. R. 140, under name of *S. decurrens.*)

S. s. acutilobum purpureiflorum (acutely-lobed, purple-flowered). *fl.* purple. *l.* pinnatifid. (B. M. 2828, under name of *S. Balbisii purpurea.*)

Solanum—*continued.*

S. s. bipinnatipartitum (bipinnatipartite). *fl.* white or purple. *l.* bipinnately parted. (B. M. 3954, under name of *S. Balbisii bipinnata.*)

S. somniculentum (sleep-giving). *fl.*, calyx nearly hemispherical, small, ten-cleft; corolla diluted with violet, 2in. broad, five-plicate and angled; peduncles axillary, one-flowered. *l.* solitary or twin, petiolate, ovate, acuminate, oblique and acute at base, 2½in. long. Stem erect, branched, pilose. *h.* 1½ft. Mexico. Greenhouse. (F. d. S. v. 454.)

S. stelligerum (star-bearing). *fl.* rather small, in lateral racemes; calyx lobes narrow; corolla blue, deeply divided. *fr.* red, globular, small. *l.* petiolate, lanceolate or ovate-lanceolate, acute or acuminate, rarely broad and obtuse, usually 2in. to 4in. long. *h.* 6ft. or less. Australia, 1823. An erect, slightly prickly, greenhouse shrub. (S. E. B. ii. 88.)

S. texanum (Texan). *fl.* drooping; calyx stellate-pilose, seven or eight-cleft; corolla whitish-violet, rotate, deeply five-cleft; peduncles solitary, one-flowered. *fr.* scarlet, torulose, depressed, 1½in. in diameter, resembling tomatoes. *l.* long-petiolate, unequally sub-cordate, sinuate-repand, 5in. to 8in. long; lobes short and slightly obtuse, with violet prickles beneath. Stem 1ft. or more high, simple, almost unarmed, purplish. Texas, &c., 1861. Half-hardy annual. (F. d. S. 1398.) "*S. texanum* is probably not Texan, although raised from seeds said to have been collected there. It is probably *S. integrifolium* of Poiret" (Gray, "Synopsis").

S. Torreyi (Torrey's). *fl.* large and handsome; calyx often six lobed; corolla violet, rarely white, 1½in. in diameter, the lobes broadly ovate; cymes at first terminal, loose, two or three-cleft. *fr.* yellow, globose, 1in. in diameter. *l.* ovate, with a truncate or sub-cordate base, sinuately five to seven-lobed, 4in. to 6in. long; lobes entire or undulated, obtuse, unarmed. Prickles small and subulate, scanty, sometimes nearly wanting. *h.* 1ft. to 2ft. Texas and Arkansas, 1878. Half-hardy perennial. (B. M. 6461.)

S. trilobatum (three-lobed). *fl.*; calyx small, green; lobes ovate, sub-acute; corolla 1in. to 1¾in. in diameter, violet, blue, or white; lobes ovate-oblong, obtuse, the midrib of each white at the base, giving a stellate appearance to the base of the corolla; peduncles solitary or accompanied by a single-flowered pedicel, three to six-flowered. *fr.*, berry scarlet, globose, size of a large pea. *l.* 1in. to 3in. long, oblong, rounded, or ovate, sinuately three to five-lobed, smooth, shining. Stem, petioles, midrib, sometimes the nerves of the leaf beneath, and often the peduncles, armed with stout, recurved prickles. *h.* 2ft. to 5ft. East Indies, 1759. A prostrate, rambling, or climbing, nearly glabrous undershrub. (B. M. 6866.)

S. tuberosum (tuberous-rooted). Potato. *fl.*, corolla lilac or white, with short, deltoid segments. *fr.* usually globose. *l.* shortly petiolate; leaflets many-jugate, ovate or oblong, acute. Tubers large. *h.* 3ft. more or less. South America, 1597. (J. H. S. i. 1-4; T. H. S. v. 11.) For culture, enumeration of varieties, &c., *see* **Potato.** Several so-called tuberous-rooted species are referred, by Mr. Baker, to *S. tuberosum* as mere varieties.

S. t. demissum (humble). *fl.*, calyx five-cleft, the segments triangular, acuminate; corolla violet, circular, ten-toothed. *fr.* spheroid, glabrous. *l.* somewhat interruptedly pinnate; leaflets rounded-obovate. Root tuberous. Mexico, 1846. A prostrate, hardy perennial. (J. H. S. iii. 69, under name of *S. demissum.*)

S. t. etuberosum (non-tuberous). *fl.* large, borne in rich clusters; calyx segments not pointed; corolla of a bright purple, with a golden-yellow centre. *l.* nearly glabrous. Tubers wanting. Chili, 1833. (B. R. 1712, under name of *S. etuberosum.*)

S. t. verrucosum (warted). *fl.* deeply coloured, large. *fr.* dotted all over with white, raised points. *l.*, leaflets fewer than in the type, ovate, acute, densely hairy beneath; petiole longer. Tubers smaller, of excellent taste, with yellow flesh. Mexico. (R. H. 1853, 6, under name of *S. verrucosum.*)

S. Tweedianum (Tweedie's). *fl.* large, nodding, in umbellate racemes; calyx deeply five-cleft; corolla white or pale blue, rotate, semi-five-cleft. *l.* sub-cordate, ovate, acute, angular-toothed at the base, on long petioles. *h.* 1½ft. Buenos Ayres, 1833. Greenhouse perennial. (B. M. 3385.)

S. uncinellum (slightly hooked). *fl.*, calyx campanulate, with four rounded teeth; corolla rose-coloured, at length spreading, five-parted; panicle terminal, simple. *l.* entire, ovate-lanceolate, sub-cordate, obsoletely pubescent. Stem decumbent, filiform, pubescent. Brazil, 1837. Stove perennial. (B. R. 1840, 15.)

S. venustum (charming). A synonym of *S. Seaforthianum.*

S. Wallisii (Wallis'). *fl.* in loose, pedunculate cymes; corolla purple, 1in. to 1½in. in diameter; peduncles blackish-violet, *fr.* violet, marbled and spotted with a paler colour, large, plum-shaped, edible. *l.* simple, lanceolate, acuminate, entire, 3in. to 4in. long, 1½in. to 2in. broad, dark purplish-green; petioles and nervures (as well as the stem) blackish-violet. *h.* 2ft. Peru, 1877. A compact and bushy, stove or greenhouse species. (R. H. 1877, p. 291.)

S. Warsewiczii (Warscewicz'). *fl.* white, numerous; *l.* large, soft, oval sub-cordiform, deeply nine-lobed; petiole and midrib

Solanum—*continued.*

covered with red, stellate prickles. Native country unknown. Suffrutescent, armed with prickles, half-hardy. A garden species. (R. H. 1865, p. 430.)

S. Wendlandii (Wendland's). *fl.* lilac-blue, 2½in. in diameter; cymes 6in. and more across, terminating pendulous branches. August. *l.* bright green, variable, 2in. to 10in. long, 1½in. to 4in. broad; uppermost ones simple, oblong, acuminate, with a cordate base, or three-lobed, with the lobes sub-equal or unequal, and sometimes lobed at the sides, or trifoliolate with equal or unequal leaflets; lower leaves on the branches 6in. to 10in. long, pinnate below and pinnatifid above, with four to six pairs of lobes or leaflets, which are ovate or oblong, entire and acuminate; prickles on the stems, branches, and petioles few, scattered, short, hooked. Costa Rica, 1882. Climbing, glabrous, stove shrub. (B. M. 6914.)

SOLARIA (named in honour of Francisci de Borja Solar, an eminent Chilian mathematician). SYN. *Symea.* ORD. *Liliaceæ.* A monotypic genus. The species is a remarkable, greenhouse, bulbous plant. It thrives in a compost of sandy loam and leaf mould. The bulbs must be kept nearly dry during their resting period, the quantity of water being gradually diminished as the leaves begin to die down. Propagation may be effected by seeds, or by offsets.

S. miersioides (Miersia-like). *fl.* green, small, inconspicuous, pedicellate, erect, many in a terminal umbel; perianth segments connate at base in a shortly campanulate tube, spreading above; stamens three; involucral bracts two, scarious; scape simple, leafless. Spring. *l.* (? always) radical, solitary, broad-linear. *h.* 4in. Chili, 1871. SYN. *Symea gillesioides* (Ref. B. 260).

SOLAR INFLUENCE. Inasmuch as all life on the earth depends upon the warmth and light of the sun, it follows that Solar Influence upon plants is of the most far-reaching kind. The conversion of mineral compounds and gases into food suitable for the nourishment of plants, goes on only during light in their green parts, where chlorophyll exists; on this food, formed in their tissues, all green plants subsist, and all parasitic plants and animals are nourished indirectly by it, as they feed on living or dead plants. But, apart from this, the most important of all influences upon plant-life, the sun exerts certain other powers; and it is necessary for gardeners to take advantage of these, or to ward off the evils resulting from their action, according to the requirements of the plants affected.

Leaving untouched the subject of the Sun's Influence in regulating the seasons, the present article will deal only with the effects of exposure to the sun's rays during the season of active vegetation. All are familiar with the fact that the sun gives both heat and light. To a certain extent, the heat-rays may be converted into light, or the light-rays into heat; but this need not be taken account of here. The heat-rays are the chief source of heat with which we are acquainted, and, except in hotbeds and hothouses, they are the only source available in horticulture. They originate the vital processes of germination in seeds, and of the bursting of new buds and leaves on the bare branches in spring. But, in dry summers, and especially in confined situations, fully exposed to the sun's rays, the air and the soil become parched with drought, and plants perish for lack of water. This danger must be warded off by watering the plants, or by irrigation, if that is practicable; and subjects that are peculiarly liable to injury from drought should be protected under some kind of shelter, such as an awning. A temperature higher than that to which a plant is accustomed, if continued for some time, is apt to induce in it a weak habit of growth, owing to over-stimulation; new branches and leaves being produced more rapidly than food can be supplied for their full development. Certain injurious effects of exposure to too great heat of the sun will be treated of under **Sun-burning.**

Plants differ a good deal in the amount of *light* that they require. Most green plants need to be exposed to full sunshine for some part of each day; and if this, or, at least, full daylight, is withheld, they turn pale and

Solar Influence—*continued.*

sickly, and, sooner or later, perish. On the other hand, many Ferns, and a few flowering plants, suffer in health when exposed to bright sunshine: these plants require shady places, *e.g.*, shade of dense forests or caves. In gardens, they require special protection from light, and are usually shaded by green glass, or by green paint on the glass, or, better, by thin green cloth, as this can be removed in dull, cloudy weather.

Like heat, light sometimes proves too great a stimulus, and plants suffer from excess of it. In greenhouses, plants not unfrequently have their leaves marked with dry spots, that look as if scorched through the tissues. For their supposed causes, and for the most successful preventive treatment, *see* **Sun-burning.**

SOLDANELLA (a diminutive of *solidus*, a piece of money; alluding to the shape of the leaves). ORD. *Primulaceæ.* A small genus (three or four species) of very pretty, mostly hardy, glabrous, perennial herbs, inhabiting the Alps of Central Europe. Flowers blue, violet, or rose, rarely white, nodding; calyx five-parted, persistent; corolla hypogynous, infundibular-campanulate, five-lobed to the middle, the lobes imbricated; stamens affixed to the throat of the corolla; scapes slender, solitary or few, one-flowered or umbellately many-flowered. Leaves long-petiolate, thick, cordate-orbicular or reniform, entire. *S. alpina* is one of the most charming alpine plants in our gardens. The species succeed in a peat border, or in pots of peat and loam. Propagation may be effected by seeds, or by division.

FIG. 499. SOLDANELLA MONTANA.

S. alpina (alpine).* Blue Moonwort. *fl.* violet, fimbriated, pendent; style equalling or exceeding the corolla; pedicels pubescent, slightly glandular; scapes two to four-flowered. April. *l.* roundish-reniform, entire or sub-repand, or loosely and remotely ciliated. *h.* 3in. 1656. (B. M. 49; F. d. S. 994; J. F. A. 118.) A variety, *Wheeleri*, is the most floriferous form of this plant.

S. Clusii (Clusius'). *fl.* blue, campanulate, with a neatly notched margin; style shorter than the corolla; pedicels slightly scabrous, with minute, sessile glands; scape one, rarely two-flowered. April. *l.* cordate-reniform, slightly repand. *h.* 2in. to 3in. 1820. (B. M. 2163.) SYN. *S. pusilla* (S. B. F. G. ser. ii. 48).

S. minima (smallest). *fl.* suffused with lilac, purple-striped within, cut one-third its length, spreading; style shorter than the corolla; pedicels pubescent; scapes one-flowered. April. *l.* orbicular. *h.* 2in. 1823. (S. B. F. G. ser. ii. 53.)

Soldanella *-continued.*

S. montana (mountain).* *fl.* purple; corolla cut to the middle, equalled or exceeded by the style; pedicels shortly glandular-pubescent; scapes two to four-flowered. April. *l.* nearly round, loosely and remotely crenated. *h.* 3in. 1816. See Fig. 499. (S. B. F. G. 11.)

S. pusilla (small). A synonym of *S. Clusii.*

SOLEA. A synonym of **Ionidium** (which *see*).

SOLENA. A synonym of **Posoqueria** (which *see*).

SOLENANDRA (of Beauvois). A synonym of **Galax** (which *see*).

SOLENANTHA. A synonym of **Hymenanthera** (which *see*).

SOLENANTHUS (from *solen*, a tube, and *anthos*, a flower; alluding to the shape of the corolla). ORD. *Borragineæ.* A genus comprising about ten species of hardy, perennial herbs, inhabiting South Europe, and West and Russian Asia. Flowers blue or pink, racemose; calyx five-parted; corolla tubular or nearly funnel-shaped, with a limb of five small lobes. Leaves alternate. *P. circinatus* has been introduced, but is probably not now grown.

SOLENIDIUM (from *solen*, a tube, and *eidion*, appearance; in allusion to the shape of the flower). ORD. *Orchideæ.* A monotypic genus. The species is a curious, stove, epiphytal orchid, with the habit of *Oncidium.* It differs in the crest of its lip consisting of a pair of long, feathery, raised plates, and in one or two other technical details. For culture, *see* **Oncidium.**

S. racemosum (racemose). *fl.* yellow, spotted with red, mediocre, long-pedicellate, in a loose raceme; sepals and petals free, spreading; lip spreading at the base of the column, contracted in a long claw; scapes axillary under the pseudo-bulbs, simple. November. *l.* rather long, ensiform, thinly coriaceous, narrowed at base. Stem shortened, terminating in a one or two-leaved pseudo-bulb. *h.* 6in. Andes of Columbia. (L. & P. F. G. iii. 102.)

SOLENOMELUS (from *solen*, a tube, and *melos*, a limb; in allusion to the tubular perianth). SYNS. *Cruikshankia, Lechlera.* ORD. *Irideæ.* A small genus (two species) of half-hardy, rhizomatous plants, natives of Chili. Flowers many in a spathe, shortly pedicellate; perianth yellow, with a slender tube and spreading lobes; stamens affixed to the throat; spathe terminal, or a few on long peduncles. Leaves radical or clustered at the base of the stem, linear, and a few at the sides of the stem. Stems sometimes slightly thickened at base. For culture of *S. chilensis*, the only species introduced, *see* **Sisyrinchium.**

S. chilensis (Chilian). *fl.*, perianth deep yellow, the segments obovate, spreading, a little concave in their lower half, and there narrow, with a small, dark purple spot at the very base; spathe four or five-flowered; peduncles solitary or two to four. June. *l.*, radical ones 6in. to 8in. long; cauline ones remote, gradually shorter upwards, linear-ensiform, sheathing at base. Stems 1ft. to 1½ft. high, zigzag, leafy. 1868. SYNS. *Sisyrinchium longistylum* (F. d. S. 255), *S. pedunculatum* (B. M. 2965).

SOLENOPHORA (from *solen*, a tube, and *pherein*, to bear; in allusion to the tubular form of the corolla). Including *Arctocalyx.* ORD. *Gesneraceæ.* A small genus (four species) of stove, evergreen, branched, scabrous-pubescent shrubs, confined to Mexico. Flowers scarlet or yellow, large, solitary or few, on short, axillary peduncles; calyx tube adnate, the limb five-lobed; corolla tube elongated, with a broad throat, the limb shortly and broadly five-lobed, sub-erect. Leaves opposite, on long petioles, ample, membranous, often dissimilar. *S. Endlicheriana*, the only species introduced, is a handsome plant, requiring culture similar to **Gloxinia** (which *see*).

S. Endlicheriana (Endlicher's). *fl.* of a beautiful orange-colour, marked with purple, solitary or in fascicles of two to five; corolla infundibular-campanulate, hairy without, loosely curved, 2½in. to 3in. long. April. *l.* much spreading, broadly elliptic, acuminate, hairy, the largest 1ft. to 1½ft. long; petioles 3in. to 4in. long. Stem suffruticose, erect, purplish, 1ft. to 2ft. high, emitting aërial roots. 1849. (F. d. S. 546 and L. & P. F. G. i. 69, under name of *Arctocalyx Endlicherianus.*)

SOLENOPSIS. A synonym of **Laurentia** (which *see*).

SOLIDAGO (from *solido*, to join or make whole; alluding to reputed vulnerary qualities). Golden Rod. SYN. *Doria.* ORD. *Compositæ.* A large genus (about eighty species) of mostly hardy, perennial herbs, rarely shrubby at base; they are nearly all North American, one or two being found in South America, one in temperate Asia and Europe, and one in the Azores. Flower-heads usually yellow, small, in racemes or clusters; involucre oblong or narrowly-campanulate, the bracts appressed, many-seriate; ray florets ligulate, spreading, or rarely small and erect; achenes sub-terete or angled. Leaves alternate, entire or often toothed. Owing to the coarse habit of these plants, and the manner in which they impoverish the soil, they are mostly confined to shrubberies and old-fashioned borders, where their bright yellow flowers contrast well with Michaelmas Daisies. Of the large number of species introduced, those described below are probably the best; all are North American, *S. Virgaurea* being also found in Britain. Any common soil is suitable; and propagation may be readily effected by divisions.

S. altissima (very tall). A synonym of *S. rugosa.*

S. canadensis (Canadian). *fl.-heads* small; ray florets very short; panicle ample, crowded. August. *l.* lanceolate, acuminate, sharply serrated (sometimes almost entire), more or less pubescent beneath and rough above. Stem roughly hairy. *h.* 3ft. to 6ft. 1648.

S. Drummondii (Drummond's).* *fl.-heads* small; rays four or five, short; involucral scales oblong, obtuse; racemes short, panicled. Summer. *l.* broadly ovate or oval, somewhat triple-ribbed, coarsely and sharply serrated, some of them almost entire, beneath (as well as the stem) minutely velvety-pubescent. Stem 1ft. to 3ft. high. 1885. (B. M. 6805.)

S. elliptica axilliflora (elliptic-leaved, axillary-flowered). *fl.-heads* rather large, in short, or somewhat elongated and racemiform, erect or spreading clusters, which are mostly axillary and shorter than the leaves. *l.* oval to broadly lanceolate. *S. fragrans* (of Willdenow) is a narrow-leaved form.

S. fragrans (fragrant), of gardens. A synonym of *S. serotina.*

S. fragrans (fragrant), of Willdenow. A form of *S. elliptica axilliflora.*

S. lanceolata (lanceolate-leaved).* *fl.-heads* obconical, mostly sessile, in dense clusters; ray florets fifteen to twenty. September. *l.* linear-lanceolate, entire, roughish above, pubescent on the veins beneath. Stem pubescent above, corymbose. *h.* 2ft. to 3ft. 1758. (B. M. 2546.) SYN. *Euthamia graminifolia.*

S. multiradiata (many-rayed). *fl.-heads* large, in a dense, thyrsoid or corymbose raceme; involucral scales narrow, nearly glabrous; ray florets eight to twelve. July. *l.* ciliated, oblong-lanceolate, acute or obtuse, tapering to the base. Stem villous-pubescent, simple, or rarely branched at the summit. 1776.

S. odora (odorous). *fl.-heads*, ray florets three or four, rather large; racemes spreading, in a small, one-sided panicle. July. *l.* linear-lanceolate, entire, thickish, shining, pellucid-dotted. Stem slender, 2ft. to 3ft. high, often reclined. 1699. The crushed leaves yield a pleasant, anisate odour.

S. patula (spreading). *fl.-heads*, involucral scales oblong; ray florets six or seven; peduncles scabrous-pubescent; racemes mostly short and crowded on the elongated, somewhat leafy branches, at length spreading or recurved. August and September. *l.* large, elliptic, acute, serrated, smooth and glabrous beneath. *h.* 2ft. 1805.

S. rigida (rigid). *fl.-heads* large, in a compound corymb terminating the simple stem, not at all racemose; ray florets seven to ten. September. *l.* oval or oblong, copiously feather-veined, thick and rigid; upper ones closely sessile by a broad base, slightly serrated, the uppermost ones entire. Stem stout, 3ft. to 5ft. high, very leafy. 1710.

S. rugosa (wrinkled). *fl.-heads* small; involucral scales linear; ray florets six to nine; racemes panicled, spreading. August and September. *l.* ovate-lanceolate, elliptical, or oblong, often thickish and very rugose, coarsely and sharply serrated. Stem 2ft. to 7ft. high, roughly hairy. 1686. SYN. *S. altissima.*

S. sempervirens (evergreen). *fl.-heads* showy; ray florets golden, eight to ten; racemes short, in an open or contracted panicle. September. *l.* fleshy, very smooth, entire, lanceolate, slightly clasping, or the lower ones lanceolate-oblong, obscurely triple-nerved. Stem smooth and stout, 1ft. to 6ft. high. 1699.

S. serotina (late). *fl.-heads*, ray florets short; achenes at length nearly glabrous; peduncles roughish-pubescent; panicle pyramidal, of numerous recurved racemes. August to October. *l* lanceolate, acuminate, serrated, glabrous except on the veins beneath, the margins and usually the upper surface scabrous. Stem often glaucous. *h.* 3ft. 1758. SYN. *S. fragrans* (of gardens).

Solidago—*continued.*

S. speciosa (showy).* *fl.-heads* rather large, somewhat crowded in numerous erect racemes, forming an ample, pyramidal or thyrsiform panicle; ray florets about five, ample. October. *l.* thickish, rough, with smooth margins, oval or ovate, slightly serrated; lower ones 4in. to 6in. long (in the larger forms), contracted into a margined petiole; uppermost ones oblong-lanceolate. Stem stout, smooth, 3ft. to 6ft. high. 1817. A handsome species.

S. Virgaurea. Common Golden Rod. *fl.-heads* crowded; ray florets ten to twelve, spreading. July to September. *l.* linear- or lanceolate-oblong, 1in. to 4in. long, obscurely toothed, obtuse or acute. Stem erect, sparingly branched. *h.* 4in. to 2ft. North America, Europe (Britain), &c. (Sy. En. B. 778.) The variety *cambrica* (Sy. En. B. 779) is a dwarf form, found on rocky mountain ledges.

SOLITARY. Growing singly.

SOLLYA (named after Richard Horsman Solly, 1778-1858, a vegetable physiologist and anatomist). ORD. *Pittosporeæ.* A small genus (two species) of ornamental, greenhouse, evergreen twiners, confined to Australia. Flowers blue, nodding, on slender pedicels, in terminal, loose, few-flowered cymes, or rarely solitary; sepals small, distinct; petals spreading from the base, obovate; anthers connivent in a cone round the pistil. Leaves narrow. The species thrive in well-drained, peaty soil. Propagated by cuttings, inserted in sand, under a glass.

S. Drummondi (Drummond's). A synonym of *S. parviflora.*

S. heterophylla (variable-leaved).* Australian Bluebell Creeper. *fl.*, petals four to five lines long; cymes terminal or leaf-opposed, drooping, usually four to eight-flowered, but sometimes with twelve or more flowers. July. *l.* varying from ovate-lanceolate to ovate-oblong, and 1½in. to 2in. or more long, to lanceolate or oblong-linear, and 1in. to 1½in. long, obtuse or slightly acuminate, quite entire, usually narrowed into short petioles. *h.* 6ft. 1830. (B. M. 3523; B. R. 1466.)

S. h. angustifolia (narrow-leaved). *l.* narrow-lanceolate. Branches less twining than in the type. (B. R. 1840, 3, under name of *S. linearis.*)

S. linearis (linear). A synonym of *S. heterophylla angustifolia.*

S. parviflora (small-flowered).* *fl.* blue, small, solitary or two or three in a cyme, on very fine, filiform pedicels; petals about ¼in. long. July. *fr.* ½in. to ¾in. long, tapering to both ends. *l.* lanceolate or oblong-linear, the larger ones often above 1in. long, but in some specimens all under ½in., very shortly petiolate, and thinner than in *S. heterophylla.* 1833. SYN. *S. Drummondi* (R. G. 261, f. 1).

S. salicifolia (Willow-leaved). Most probably a garden variety of *S. heterophylla.*

SOLOMON'S SEAL. *See* **Polygonatum multiflorum.**

SOLOMON'S SEAL, FALSE. *See* **Smilacina.**

SOMMERFELDTIA. A synonym of *Drepanocarpus.*

SONCHUS (from *Sogchos*, the ancient Greek name used by Theophrastus). Sow-thistle. Including *Atalanthus.* ORD. *Compositæ.* A genus comprising about twenty-four species of greenhouse or hardy, annual or perennial herbs, sometimes shrubby at base. Flower-heads yellow, mediocre or rather large, irregularly corymbose-paniculate or sub-umbellate, rarely solitary; involucre conical after flowering, the bracts in many series, imbricated; receptacle flat, naked; florets all ligulate; pappus bristles copious. Leaves radical or alternate, the cauline ones often auriculate-amplexicaul, entire, toothed, pinnatifid, or dissected. *S. arvensis* (Corn Sow-thistle) *S. oleraceus* (Hare's Lettuce, Milk Thistle), and *S. palustris*, are included in the British Flora. *S. oleraceus* was formerly used as a potherb. Few of the species boast of any horticultural merit. The four shrubby species described below are sometimes grown in conservatories, on account of their elegant foliage. They thrive in common soil, and may be increased by cuttings, inserted in sand, under a glass.

S. gummifer (gum-bearing).* *fl.-heads* few, in an irregular, glabrous corymb; involucral scales blackish, slightly appressed, acuminate. Summer. *l.* glabrous, pale beneath; sub-radical ones pinnatifid, the lobes triangular, slightly toothed, acuminate, the terminal one lanceolate-oblong; cauline leaves auricled, rounded, amplexicaul. *h.* 2ft. to 3ft. Canary Islands, 1861. (B. M. 5219.)

Sonchus—*continued.*

S. Jacquini (Jacquin's).* Lachuza de Pastor; Pastor's Lettuce. *fl.-heads* deep golden-yellow, 2in. to 3in. in diameter; involucral bracts appressed, slightly woolly, obtuse. March. *l.* crowded, 6in. to 12in. long, 2in. to 3in. broad, spreading and recurved, cordate and half-amplexicaul, oblanceolate, pinnatifid to or beyond the middle, denticulate and ciliate: lobes triangular, acute. *h.* 1ft. to 2ft. Canary Islands, 1882. A stout, erect, slightly-branched herb, with a woody stem below, sparingly clothed here and there with patches of snow-white wool. (B. M. 6142.)

S. pinnatus (pinnate). *fl.-heads* in a corymbose, branched panicle; involucral scales appressed, glabrous, acuminate, linear or scarcely lanceolate. Summer. *l.* glabrous, pinnatipartite; lobes linear-lanceolate, slightly toothed or entire, the terminal one elongated. *h.* 3ft. Madeira, 1777.

S. radicatus (long-rooted). *fl.-heads* in a glabrous, irregular corymb; involucral scales blackish, the outer ones broadly ovate, the inner ones linear-lanceolate. Summer. *l.*, radical ones somewhat lyrately pinnatipartite, glaucous beneath, with ovate, obtuse, slightly toothed lobes, the terminal one obtusely triangular; cauline leaves auricled, rounded, amplexicaul. *h.* 1ft. Canary Islands, 1780. (B. M. 5211.)

SONERILA (from *Sootli-Soneri-ila*, the Khassee name for one of the species). ORD. *Melastomaceæ.* A genus comprising about fifty-three species of stove herbs or small shrubs, of variable habit, glabrous, hairy, or slightly paleaceous, caulescent or stemless and scapigerous, natives of mountainous parts of the East Indies. Flowers often rosy, disposed in scorpioid racemes or spikes; calyx glabrous or bristly, with an oblong, turbinate, or campanulate tube, and a three-lobed, short, often dilated limb; petals three, ovate, obovate, or oblong, acute, acuminate, or obtuse; stamens three, equal (very rarely six, the alternate ones smaller). Leaves equal or dimorphous, frequently membranous, entire or serrulated, three to five-nerved. Several ornamental species have been introduced. They require a damp atmosphere, and should be allowed partial shade. A compost of fibrous peat, broken small, with a little chopped sphagnum, some sand, and small pieces of charcoal or crocks, intermixed, is most suitable. Propagation may be effected by seeds, which ripen freely; or by cuttings, inserted singly in small pots, during spring, and placed beneath a bell-glass, in a propagating house. All flower in the summer.

S. Bensoni (Benson's).* *fl.* rose-purple; stamens six; anthers all yellow, not produced at the base; peduncle upwards and raceme hairy. 1873. "This plant seems exactly *S. speciosa.* The change of habitat and forcing in rich soil in an English stove may have developed the three stamens usually suppressed in the genus (?)" (C. B. Clarke). (B. M. 6049.)

S. elegans (elegant), of Hooker. A synonym of *S. speciosa.*

S. grandiflora (large-flowered). *fl.* mauve; petals nearly ¾in. long, elliptic; racemes dense-flowered; peduncles short, terminal. *l.* crowded on the branchlets, 1in. to 2in. long, oblong or elliptic, narrowed at both ends, acute, glabrous, bristly-serrated. Stems very woody below, branching round. *h.* 1ft. 1855. (B. M. 5354.)

S. margaritacea (pearl-spotted).* *fl.* rose-coloured, eight to ten in a corymb; peduncles red, terminal, generally surrounded at base by a whorl of sub-sessile leaves. *l.* opposite, oblong- or ovate-lanceolate, acute or acuminate; veins oblique, parallel, very dark glossy-green above, with oval, white, margaritaceous spots, arranged in single lines or series, between them; under surface pale, the veins red-purple. Stems rather weak and sub-procumbent, 3in. to 10in. long, rich scarlet. 1854. (B. M. 5104; F. d. S. 1126.) The variety *argentea* has leaves surfaced with silvery-grey; in *marmorata*, they are banded with silvery-grey.

S. m. Hendersoni (Henderson's).* *fl.* bright lilac-rose, abundantly produced, with prominent, lemon-yellow, arrow-shaped anthers. *l.* ovate, flat, dark olive-green, studded over the whole surface with pearly-white spots. *h.* 6in. to 8in. 1875. A compact and free-flowering plant. (F. M. n. s. 159; I. H. n. s. 230; R. G. 897.)

S. orbiculata (round-leaved). A synonym of *S. speciosa.*

S. speciosa (showy). *fl.* mauve; petals ¾in. long, round-elliptic, acute; raceme often sub-paniculate, with eight to fourteen flowers, and very hairy. *l.* 2in. to 3in. long, ovate-elliptic, acute, glabrous or nearly so, denticulated or slightly serrated; petioles 1in. to 2in. long. Stem nearly or quite glabrous below, ending in a long peduncle, villous upwards. *h.* 9in. to 12in. 1856. (B. M. 5026; F. d. S. 2442.) SYNS. *S. elegans* (B. M. 4978), *S. orbiculata.*

S. stricta (erect). *fl.* rose-purple, small; petals obovate. *l.* ¼in. to 1in. long, lanceolate or elliptic, narrowed at each end, with scattered, lax hairs. Stem 3in. to 7in. high, erect, often branched, more or less puberulo-pubescent, and also with long, lax, spreading hairs. 1848. (B. M. 4394.)

SONNERATIA (named in honour of Pierre Sonnerat, 1749-1814, who travelled into New Guinea, the East Indies, and China, and communicated many new plants to the botanists of Europe). SYN. *Aubletia.* ORD. *Lythrarieæ.* A genus comprising five or six species of highly glabrous, stove shrubs and small trees, inhabiting the tropical sea-shores of the Eastern hemisphere. Flowers ample, ebracteolate, in threes at the tips of the branchlets, or axillary and solitary; calyx thickly coriaceous, with a campanulate tube and a four to eight-lobed limb; petals four to eight, small, or wanting; stamens numerous. Berry sub-globose, ten to fifteen-celled, many-seeded. Leaves opposite, petiolate, coriaceous, oblong, acute or obtuse, entire. The three species known to cultivation require similar treatment to that advised for **Lagerströmia.**

S. acida (acid). *fl.* six-cleft; petals red. June. *fr.* having acrid pulp. *l.* oval-oblong. Branchlets tetragonal. East Indies, 1822. A small tree. The fruits of this species are eaten as a condiment by the Malays.

S. alba (white-flowered). *fl.* white, six to eight-cleft, apetalous. May. *fr.* obconical at base, depressed above. *l.* roundish-oval, 2in. to 4½in. long, rounded or retuse at the apex. Branchlets terete. East Indies, 1824. A small tree.

S. apetala (apetalous). Kambala-tree. *fl.* white, four-cleft, apetalous. June. *l.* ovate-lanceolate. Branchlets terete, pendulous. East Indies, 1826. Tree attaining 40ft., growing in Mangrove swamps flooded by the tide.

SOOT. This substance is employed in gardening, either as a fertiliser, or to prevent or cure insect ravages, or with all these objects combined. It is, in by far the greater proportion of cases, obtained from chimneys, from the smoke of coal fires. Taken from this source, it usually consists of about 12 per cent. water, 35 to 50 per cent. ash, and the rest volatile substances, which are destroyed by complete combustion. The last-named substances are largely composed of Ammonia; this gives a pungent smell, which is rendered much stronger when quicklime and water are mixed with the Soot. There are also various oily substances, possessed of peculiar smells, and certain acids, formed and driven off by heat during the combustion of coal, that become mixed with the Soot. The ash of Soot contains Calcium, Iron, Magnesium, Potassium, and Sodium, combined variously with Phosphoric and Sulphuric Acids; there is also present a small quantity of Silica and Silicates.

The fertilising effect of a top-dressing of Soot is very decided, and seems to be due, in a great degree, to the presence of Sulphate and Chloride of Ammonium; but the other substances may also produce some effect. Soot has been found to greatly benefit Potatoes, when put into the drills. As a remedy against those larvæ that lie underground during the day, and crawl up to feed on the plants at night, Soot is especially useful, if laid rather thickly around the stems; it will also stimulate the plants to healthy growth. It is also frequently scattered as a top-dressing, or along the drills, about the time when any crop is liable to visits of the parent insects intent on egg-laying; in such a case, it acts as a preventive of attacks. Soot is also used, instead of hellebore powder, for scattering over plants attacked by larvæ (*e.g.*, Sawfly larvæ on Currant-bushes), or by perfect insects (*e.g.*, Turnip Flea on Turnips), and gives valuable results when rightly employed; but care must be taken to avoid applying it when the flavour of the crop would be injured.

To cleanse walls from Red Spider, water with which Soot has been mixed till all that can be dissolved from it has been so, is made up with clay till the mixture is of the consistence of thick paint; and then about 1lb. of flowers of sulphur and 2oz. of soft soap are added to each gallon of the compound. To protect the fruit-trees on the walls from the attacks of the mites, this mixture should be applied all over the wall once a year, taking care to close all crevices.

SOPHORA (altered from *Sophero*, the Arabic name for a papilionaceous-flowered tree). Including *Edwardsia* and *Styphnolobium.* ORD. *Leguminosæ.* A genus comprising about twenty-two species of stove, greenhouse, or hardy, evergreen or deciduous trees, shrubs, or rarely perennial herbs, inhabiting the warmer regions of the globe. Flowers white, yellow, or rarely bluish-violet, disposed in simple, terminal racemes, or in a terminal, leafy panicle; calyx teeth short; standard broadly obovate or orbicular, erect or spreading; stamens free or rarely nearly connate in a ring at the base; bracts small; bracteoles none. Pods moniliform, compressed. Leaves imparipinnate; leaflets indefinite, small, exstipellate. The hardy and half-hardy species thrive in well-drained sandy loam, and are most readily raised from imported seeds. The variegated and weeping forms of *S. japonica* must be grafted on the green-leaved type. *S. tetraptera* and *S. t. microphylla* flower freely in many places when planted against a sunny wall, in sheltered spots in the open air; and in the South-west, they do well as standard trees, without the shelter of a wall. The best-known species are described below.

FIG. 500. WINTER STATE OF SOPHORA JAPONICA PENDULA.

S. bifolia (two-leaved). A synonym of *Ammodendron Sieversii.*

S. chrysophylla (golden-leaved). *fl.* yellow, axillary, in short, racemose spikes; petals of the keel elliptic, with the dorsal margin straight. May and June. *l.*, leaflets seventeen, obovate; younger ones clothed with yellow pubescence. *h.* 6ft. to 10ft. Sandwich Islands. Greenhouse, deciduous shrub. SYN. *Edwardsia chrysophylla* (B. R. 738).

S. glauca (glaucous). *fl.* pale purple, in long, racemose spikes; petals imbricated; standard bifid. May and June. *l.*, leaflets twenty-three, alternate, elliptic, mucronate, velvety on both surfaces, as well as the peduncles and branches. *h.* 4ft. to 6ft. Nepaul, 1820. A very showy, half-hardy, deciduous shrub. SYN. *S. velutina* (B. R. 1185).

S. heptaphylla (seven-leaved). *fl.* yellow; racemes opposite, about as long as the leaves. October. *l.*, leaflets alternate or nearly opposite, usually three or four on each side, oblong or obovate-oblong, slightly acuminate, rounded or slightly acute at base, hairy-pubescent beneath, 1in. to 3in. long. *h.* 6ft. Neilgherries, &c., 1830. Hardy, deciduous shrub or small tree.

S. japonica (Japanese).* Chinese or Japanese Pagoda-tree. *fl.* whitish or cream-coloured, small; panicles loosely-branched, terminal, large. August and September. *l.* graceful, deep bluish-

Sophora—*continued.*

green, pinnate; leaflets eleven to thirteen, oblong-ovate, acute. Naked young wood dark green. *h.* 30ft. to 40ft. China, 1763. A very handsome, hardy, deciduous tree. China and Japan. (A. B. R. 585.) SYN. *Styphnolobium japonicum.*

S. j. pendula (pendulous). An exceedingly beautiful tree of the "weeping" class. See Fig. 500.

S. j. variegata (variegated). A form with variegated leaves, but not particularly ornamental.

S. macrocarpa (large-fruited). *fl.* yellow; racemes short, axillary. April. Pods silky, wingless. *l.*, leaflets thirteen to nineteen, elliptic-oblong, obtuse, coriaceous, silky beneath. *h.* 8ft. to 10ft. Chili, 1822. An elegant, greenhouse, evergreen shrub. (L. B. C. 1125.) SYN. *Edwardsia chilensis* (B. R. 1798).

S. secundiflora (side-flowering).* *fl.* violet, rather large, secund; racemes terminal, crowded. June. *l.*, leaflets nine to thirteen, elliptic-oblong, obtuse, coriaceous, smoothish. *h.* 6ft. Mexico, 1820. A beautiful, greenhouse, evergreen shrub. (R. H. 1854, 201.)

S. tetraptera (four-winged).* *fl.* yellow, 1in. to 2in. long; wings linear-oblong; racemes axillary, pendulous, four to eight-flowered. May. *l.* 1in. to 6in. long; leaflets six to forty pairs, broadly obcordate to linear-oblong, ¼in. to ¾in. long, rounded, retuse, or two-lobed at the tip, silky or densely villous on old plants. *h.* 6ft. to 12ft. New Zealand, 1772. Half-hardy, deciduous tree. (G. C. n. s., ix. 729.)

S. t. grandiflora (large-flowered). Kowhai. *fl.* 2in. long, narrower than in the type. *l.*, leaflets ten to thirty pairs, usually narrow. Trunk sometimes 1ft. to 3ft. in diameter. A large and robust variety. (B. M. 167, under name of *S. tetraptera.*)

S. t. microphylla (small-leaved). New Zealand Laburnum. *fl.* 1in. to 1½in. long, broader than in the species. *l.*, leaflets on old plants thirty to forty pairs, oblong-obcordate. Young branches very slender and flexuous, with few obcordate, membranous leaflets. SYNS. *Edwardsia Macnabiana* (B. M. 3735), *E. microphylla* (B. M. 1442.)

S. tomentosa (tomentose). *fl.* yellow, showy; racemes elongated. August. Pods stipitate, 5in. long. *l.*, leaflets eleven to seventeen, oblong, coriaceous, becoming smooth above. *h.* 4ft. to 6ft. North America, &c., 1739. A half-hardy, deciduous, hoary-tomentose shrub. (B. M. 3390.)

S. velutina (velvety). A synonym of *S. glauca.*

SOPHRONANTHE. A synonym of **Gratiola** (which *see*).

SOPHRONITIS (from *sophron*, modest; in reference to the pretty little flowers of the original species). ORD *Orchideæ.* A small genus (four or five species) of dwarf-growing, tufted, cool-house, epiphytal orchids, inhabiting the Organ Mountains of Brazil. Flowers very showy, scarlet or violet, borne in short, few-flowered racemes, or solitary from the top of the pseudo-bulb; sepals free, equal, flat, spreading; petals similar or broader; lip erect, the lateral lobes broad and connivent, wholly concealing the short and rather thick column, the middle lobe sub-recurved, entire; pollen masses eight. Leaves coriaceous or fleshy, complicated, at length unfolding, spreading. Pseudo-bulbs clustered on a rhizome, one or two-leaved. The species are well worthy the attention of cultivators, and have the advantage of occupying but little space. They require to be grown in small pans, or on blocks or rafts. The material they prefer is very fibry peat, to which may be added a little crushed charcoal. Perfect drainage is necessary. All the Sophronites require abundance of moisture throughout the year. Propagation may be effected by divisions, made just as growth commences.

S. cernua (drooping). *fl.* rose-red, yellowish in the centre, small, produced in short, effuse, axillary racemes; column white, with dark purple wings. Winter. *l.* solitary, ovate, apiculate, rather above 1in. long. *h.* 3in. 1827. (B. M. 3677; B. R. 1129; L. & P. F. G. iii. p. 11.)

S. coccinea (scarlet). A synonym of *S. grandiflora.*

S. grandiflora (large-flowered).* *fl.* brilliant scarlet or cinnabar-red, of stout substance, over 3in. in diameter, solitary; sepals linear-oblong, obtuse; petals three times as wide as the sepals; lip undivided, ovate, cucullate at base. Winter. *l.* solitary, oblong, acute, dark green. Stems short, ovate, terete. A very beautiful species. SYNS. *S. coccinea* (F. d. S. 1716), *Cattleya coccinea.* A remarkable hybrid between this species and *Cattleya intermedia*, raised by Messrs. Veitch, five years ago, produced flowers in 1886, and has been described by Reichenbach, in the "Gardeners' Chronicle," n. s., vol. xxvi., p. 263, under name of *Lælia Batemaniana.* This plant has the short peduncle of a

Sophronitis—*continued.*

Sophronitis and a short-stalked, Lælia-like flower of a light purple rose-madder, with the very lightest mauve hue, which appears to get deeper as the flower gets older; the middle lacinia of the trifid lip is of the warmest Dahlia carmine, with a light mauve hue; the side laciniæ and disk are white, with a light mauve-purple border. The change in nomenclature brought about by this extraordinary cross is given in Prof. Reichenbach's words: "Hence I must reduce Sophronitids as *Lælia cernua, pterocarpus, militaris, purpurea, grandiflora*, for those who accept changes, and leave alone *Sophronitis violacea* with a remodelled character."

S. g. purpurea (purple). *fl.* purplish; petals blunt. *l.* cuneate-elliptic, acute. Pseudo-bulbs very short, thick, fusiform. 1878.

S. g. rosea (rosy). *fl.* of a clear rosy-lake or carmine-rose. A rare form. (Gn. xxv., p. 474.)

S. grandiflora (large-flowered), of Hooker. A synonym of *S. militaris.*

FIG. 501. STEM AND FLOWERS OF SOPHRONITIS MILITARIS.

S. militaris (military).* *fl.* solitary, fully 3in. across; sepals and petals bright cinnabar or deep crimson, the former oblong-lanceolate, the latter roundish-elliptic; lip yellow, streaked with bright red, three-lobed, the side lobes incurved, the front one flat and acuminate. November and December. *l.* solitary, elliptic. Pseudo-bulbs oblong-cylindrical. *h.* 6in. 1837. The finest species in the genus; it should be found in every collection. See Fig. 501. SYN. *S. grandiflora* (B. M. 3709; F. M. 329; L. & P. F. G. iii., p. 11, f. 237; L. S. O. 5; P. M. B. ix. 193).

S. pterocarpa (wing-fruited). *fl.* rosy-purple; lip ovate, crested; ovary six-winged, long-beaked; raceme short, corymbose. March. *l.* coriaceous, roundish-oblong. *h.* 3in. 1842. A rare plant in gardens. (L. & P. F. G. iii., p. 11, f. 239.)

S. violacea (violet).* *fl.* violet, solitary; lip obovate, acute, naked, gibbous at base; column with large, fleshy, obtuse, falcate wings; scape terminal, many-bracted at base. Winter. *l.* solitary, linear, dark green, longer than the scape. Pseudo-bulbs oval, small. *h.* 3in. 1838. (B. M. 6880; L. & P. F. G. iii., p. 11, f. 238.)

SOPUBIA (said to be a native name in the East Indies). SYNS. *Gerdaria, Raphidophyllum.* ORD. *Scrophularineæ.* A genus comprising eight or nine species of stove, erect, usually annual herbs, natives of tropical and Southern Africa, Madagascar, the East Indies, the Malayan Archipelago, and Australia. Flowers bracteate, spicate or racemose; calyx campanulate, five-toothed or five-lobed; corolla with a short tube and five broad, spreading lobes; stamens four, didynamous; pedicels bibracteolate. Leaves opposite, or the upper ones alternate, narrow, often laciniate. *S. delphinifolia* appears

Sopubia—*continued*

to be the only species introduced to our gardens. It is a handsome perennial, thriving in peaty soil; it may be increased by cuttings, inserted under a glass, or by seeds.

S. delphinifolia (Delphinium-leaved). *fl.* rose-coloured, subsessile; corolla sub-campanulate, 1in. to 1½in. long, 1in. in diameter. July. *l.* 1in. long, pinnatisect; segments almost as long, few, filiform, flexuous. Stem erect, four-grooved, 3ft. to 4ft. high, spotted with purple. India, 1800. SYN. *Gerardia delphinifolia.*

SORANTHE. A synonym of **Sorocephalus** (which *see*).

SORBUS. Included under **Pyrus** (which *see*).

SORDID. Any dirty or muddy colour.

SOREDIATE. Bearing small patches on the surface.

SOREMA. A synonym of **Nolana** (which *see*).

SOREMA. A heap of carpels belonging to the same flower.

SORGHUM (said to be from *Sorghi*, the Indian name). Millet Grass. SYN. *Blumenbachia* (of Koeler). ORD. *Gramineæ*. A genus consisting, according to the authors of the "Genera Plantarum," of only a couple of species of half-hardy or greenhouse, annual or perennial grasses, inhabiting the warmer parts of the globe, and more or less extending into temperate regions, one being nearly cosmopolitan. Spikelets numerous, ternate, the central one sessile, the lateral ones pedicellate; panicle terminal, ample, dense or effuse. Leaves flat, often long and broad. *S. vulgare* (Indian Millet) has been tried in England as a general crop, but the climate has been found too cold and damp for the proper ripening of its seeds; the plant is frequently grown in botanic gardens, but has no interest from a horticultural point of view. It is extensively cultivated as an article of food in warmer countries. *S. halepense* is a handsome, hardy species, thriving in ordinary garden soil. Increased by seeds, or by divisions.

S. halepense (Aleppan). *fl.* purplish; panicle 3in. to 12in. or more long, loose and often much branched. *l.* long and flat, often rather broad, the midrib usually white and prominent. Stems erect, 2ft. to 10ft. high, the nodes glabrous. Mediterranean region, &c.

SORINDEIA (said to be the native name in Madagascar). ORD. *Anacardiaceæ*. A genus comprising about half-a-dozen species of small, stove, glabrous trees, natives of tropical Africa, Java, and Madagascar. Flowers purple or yellow, small; calyx cup-shaped, five-toothed; petals five, rarely more, valvate; stamens in hermaphrodite flowers, five, in males ten to twenty; panicles terminal, branched, bracteate, sparse-flowered. Drupes compressed, one-seeded. Leaves alternate, imparipinnate; leaflets entire. *S. madagascariensis* is the only species introduced. Its fruits have been described as "of a pleasant, sweet-sour, mango taste, but acrid also. These groups grow in a remarkable and interesting way, not only from the branches, but chiefly from the main trunk of the tree, looking as if they were air-roots with fruit upon them, or like parasites. There may be 200 of the tempting fruits hanging in great bunches, 2ft. in length." For culture, *see* **Anacardium.**

S. madagascariensis (Madagascar). *fl.* purple, small, in axillary racemes. May. *l.* on woody petioles. *h.* 10ft. Madagascar, 1828.

SOROCEPHALUS (from *soros*, a heap, and *kephale*, a head; alluding to the clustered heads of flowers). SYN. *Soranthe*. ORD. *Proteaceæ*. A genus embracing about ten species of greenhouse, erect or rarely diffuse, Heath-like, densely leafy shrubs, confined to South Africa. Flowers in small heads, clustered in corymbose or capitate spikes; perianth slender, the limb globose or oblong. Leaves scattered, clustered, or nearly imbricated, lanceolate or narrow, sometimes subulate, entire, or the lower ones dissected. A selection of the best-known species is here given. Some of them should be seen in every collection. For culture, *see* **Protea.**

Sorocephalus - *continued.*

S. diversifolius (variable-leaved). *fl.* purple; heads as large as a small plum, solitary, sessile, ovate, obtuse. June. *l.* spathulate-lanceolate, smooth, glabrous; lowest ones 2in. long, trifid-bipinnatifid, channelled; upper ones ½in. long, undivided, imbricated, slightly obtuse, sub-concave. Stem slender, nearly simple, pubescent above. *h.* 2ft. to 6ft. 1803.

S. imbricatus (imbricated). *fl.* lilac, four to five lines long, the lamina bearded; heads sub-ovate, as large as a plum, often two or three aggregate; peduncle scarcely ½in. long. June. *l.* imbricated, oblong-lanceolate, acute, inflexed-mucronulate, at length somewhat spreading, four to five lines long, scabrous-dotted on the back. Branches slightly pilose, at length glabrous. *h.* 3ft. 1794. An elegant shrub. SYN. *Protea imbricata* (A. B. R. 517).

S. lanatus (woolly). *fl.* purple, plumose-bearded, in heads as large as a hazel-nut; involucre five to seven-leaved, coloured; peduncle short, with or nearly without bracts. August. *l.* imbricated, subulate-linear, four to eight lines long, channelled above, obtusely carinate at back, or rounded, slightly scabrous-dotted, pilose-ciliated. Branches slightly pilose. *h.* 2ft. 1790.

S. setaceus (bristly). *fl.* purple, the claw rather loosely tomentose, the lamina bearded; heads varying in size between a cherry and a plum; spike sessile, ovate. July. *l.* bristly, slender, smooth, 1in. to 1½in. long, mucronate, and, as well as the branchlets, pubescent. Branches straight, slightly tomentose. *h.* 2ft. 1823.

SOROMANES. Included under **Acrostichum** (which *see*).

SOROSE. Heaped, or bearing sori.

SOROSIS. A fleshy mass formed by the consolidation of numerous flowers, seed-vessels and their receptacles: *e.g.*, Bread-fruit, Mulberry, Pineapple.

SORREL (*Rumex*). Two or three species of *Rumex* are cultivated in gardens under the name of Sorrel; the common species (*R. Acetosa*) is a native of Britain. All are hardy perennials. Their leaves are used in salads and culinary preparations, and as a substitute for Spinach. Any kind of Sorrel succeeds best in a rather deep soil and moist situation. Plants may be raised from seeds, sown in drills about 15in. apart, in autumn or spring; or by dividing the rootstocks in March and April. When the

FIG. 502. SORREL.

seedlings are about 3in. high, thin them out to 12in. apart, and keep the ground occasionally hoed between afterwards. A plantation will last three or four years. Some leaves may be gathered for use in about two months from the time of seed-sowing. Besides the common species, *R. Acetosa*—of which there are numerous forms that have received distinctive names, indeed several have been described as species by continental botanists—there is the French Sorrel (*R. scutatus*), which has leaves more acid. This latter is distributed throughout Europe, but is not truly native in Britain; it is, however, naturalised in many places in the British Isles.

SORREL-TREE. *See* **Oxydendron arboreum.**

SORROWFUL-TREE. A common name for *Nyctanthes arbor-tristis.*

SORUS (from *soros*, a heap). The name given to each of the little dark spots so commonly seen on the back of full-grown Fern-fronds (see Figs. 503 and 504), or crowded on specially modified pinnæ (see Fig. 505) or fronds (see Fig. 506). Seen through a lens, these

FIG. 503. PINNA OF POLYPODIUM BRASILIENSE, showing circular Sori without Indusia.

spots prove to be made up of a crowd or heap of small boxes or **Sporangia** (which *see*), each filled with **Spores** (which *see*). The sorus may be bare, as in *Polypodium* (see Fig. 503), or it may be covered with a membrane,

FIG. 504. BACK OF FERTILE FROND OF ASPLENIUM ADIANTUM-NIGRUM, showing Sori with Indusia, fixed by one edge along the side of the Sori.

called the indusium. This covering in some, *e.g.*, *Asplenium* (see Fig. 504) is fixed by one edge along the side of the Sorus; in others, *e.g.*, *Aspidium*, it is fixed by the middle, so as to resemble a shield; in others, *e.g.*, *Hymenophyllum* and *Trichomanes*, it forms a cup around the base of the Sorus; and there are many other less important variations in form. The Sori are situated on the veins, or at their ends along the edges of the fronds. Differences in the arrangement of the Sori, and in the structure of the indusia, are much employed in distinguishing the numerous genera of Ferns from one another.

SOUARI NUT-TREE. A name applied to *Caryocar nuciferum*.

SOULANGIA. Included under **Phylica** (which *see*).

SOUR GOURD. A common name for *Adansonia digitata*.

SOUROUBEA. A synonym of **Ruyschia** (which *see*).

SOUR SOP, or **CUSTARD APPLE.** *See* **Anona muricata.**

SOUTH AFRICAN YELLOW WOOD. *See* **Podocarpus elongata.**

FIG. 505. PORTION OF FERTILE FROND OF OSMUNDA REGALIS, showing Sori on modified Pinnæ.

SOUTHERNWOOD (*Artemisia Abrotanum*). A very old inhabitant of nearly every garden. The plant is grown for its medicinal properties, which are somewhat similar to those of Wormwood. Any ordinary garden soil is suitable for its culture. Southernwood may be easily propagated from cuttings, which root very readily in early summer; also by seeds. The latter are very minute.

SOUZA. A synonym of **Sisyrinchium** (which *see*).

SOWBREAD. *See* **Cyclamen.**

SOWERBÆA (named in honour of James Edward Sowerby, 1759-1828, an eminent botanical artist). ORD. *Liliaceæ*. A small genus (three species) of greenhouse, tufted perennials with fibrous roots, limited to Australia. Flowers pink, in a terminal, globular umbel; perianth persistent without twisting, of six oblong or ovate segments, all free, or the inner ones shortly connate at base; stamens three; scapes or stems leafless, simple or rarely branched at the base. Leaves at the base of the stem linear-loriform. Two of the species are grown in this country. They thrive in a mixture of sandy loam and peat. Young plants are easily obtainable by divisions.

S. juncea (Rush-like). *fl.*, perianth segments oval-oblong; umbel many-flowered. May. *l.* at base of stem somewhat distichous,

Sowerbæa—*continued.*

linear-filiform, terete, all short or some nearly as long as the stem, bordered at base and sometimes up to 2in. with scarious, sheathing margins. Stem simple, slender, 1ft. to 2ft. high. 1792. (A. B. R. 81; B. M. 1104; T. L. S. v. 6.)

S. laxiflora (loose-flowered). *fl.*, perianth segments about ¼in. long, much narrower than in *S. juncea*; umbels loose. June. *l.* crowded at the base of the stem, but sometimes extending some way up, the sheath less prominent and not at all scarious. Stems 1ft. to 2ft. high, sometimes slightly branched at the base. 1839. (B. R. 1841, 10.)

SOW THISTLE. *See* **Sonchus.**

FIG. 506. OPHIOGLOSSUM VULGATUM, showing Creeping Rootstock and Barren and Fertile Fronds.

SPADES. These are the most essential of tools in use throughout the whole year in eve y garden, whether large or small. Although often considered as being a subject of comparatively little importance, digging, or the art of using a Spade, is really quite the reverse. A great difference is noticeable in the way workmen use a Spade. The proper method of doing so is only learned by experience; even amongst several workmen in a garden, one or two may generally be selected who are more to be trusted than any of the others for digging amongst plants, or where it is important to secure an even surface. It is of great advantage when a workman can dig in either direction – that is, use the Spade with either the right or the left hand on top of the handle. Garden ground may require digging to leave the surface even, or, in autumn, it may be advantageous to merely turn and throw it up rough, for exposure to the weather.

Spades—*continued.*

Digging with a Spade is sometimes a dangerous proceeding near the roots of plants; in this case, it is generally preferable to use a fork instead. Spades should always be cleaned after being used, and placed in the tool-shed: it is impossible to work properly with them if they are allowed to get rusty by being left lying about. There are several sizes of Spades made; some, purposely intended for digging drains, have narrow blades, which are rather long in proportion. A medium size, usually known as No. 3, is that most generally useful for digging garden ground. Larger or smaller sizes are sometimes preferred when the soil to be dug is either very light or very heavy.

SPADICEOUS. Bearing, or partaking of the nature of, a Spadix.

FIG. 507. ARUM DRACUNCULUS, showing the Spadix (*s*) projecting from the Spathe (*sp*), which is open above, but remains closed below around the Flowers.

SPADIX (from the Greek *spadix*, a Palm branch bearing fruit). A form of inflorescence, usually having the rachis rather fleshy, with the flowers imbedded in

FIG. 508. ANTHURIUM SCHERZERIANUM MAXIMUM, showing unbranched Spadix (*s*) lying on an open Spathe (*sp*).

Spadix—*continued.*

pits, less often only sessile on its surface. The inflorescence, before the flowers open, is almost always entirely inclosed in one or more spathes, growing from the peduncle (*e.g.*, *Arum*, see Fig. 507); but in a few Palms (*e.g.*, *Calamus* and its allies) there are numerous spathellæ or small spathes, inclosing only groups of flowers. Rarely (*e.g. Acorus*), the Spadix is not inclosed in either spathes or spathellæ. The Spadix is usually unbranched (*Anthurium*, see Fig. 503, *Calla*, and some Palms), but in the Palms it is frequently branched (*see* **Palmæ**). In the family *Aroideæ* (*Araceæ*), and in most genera of Palms, the flowers on the Spadices are individually male or female, but both sexes may occur on the same Spadix, or may be restricted to separate Spadices, or even to separate plants. In certain Palms, hermaphrodite flowers are produced, sometimes along with male or female flowers. Briefly, a Spadix may be defined as a more or less fleshy spike, usually inclosed, before flowering, in one or more spathes, and bearing unisexual flowers; but no exact definition of the term can be consistently adhered to.

SPADOSTYLES. Included under **Pultenæa** (which *see*).

SPAN. In length, about 9in. The term refers to the space between the tips of the thumb and little finger when spread out.

SPANISH BLUEBELL or SQUILL. *See* **Scilla hispanica.**

SPANISH BROOM. *See* **Spartium junceum.**

SPANISH CHESTNUT. *See* **Castanea sativa.**

SPANISH JUICE PLANT. A common name for *Glycyrrhiza glabra.*

SPANISH OYSTER PLANT. *See* **Scolymus hispanicus.**

SPARAXIS (from *sparasso*, to tear; alluding to the lacerated spathes). ORD. *Irideæ.* A genus comprising (according to the authors of the "Genera Plantarum") five species of pretty, greenhouse, bulbous plants, natives of South Africa. Flowers one to a spathe, sessile, rather large; perianth yellow, with a short tube and six erecto-patent lobes; stamens affixed near the base of the throat; bracts much narrower than the spathe, bidentate; spathes few, scattered, sometimes solitary, broad, scarious, striated or often marked with brown lines, fimbriate-toothed at apex. Leaves few, flat, ensiform or broadly linear, erect or falcate. Stem simple or slightly branched. The best species and varieties are described below. They require precisely similar treatment to that recommended for **Ixia** (to which this genus is allied).

S. bulbifera (bulb-bearing). *fl.* three to five, alternate, distant; perianth yellow, funnel-shaped, the segments ovate-oblong, 1in. long; spathe valves purple-striped at apex; scape simple or branched, leafy, 1ft. to 2ft. high. May. *l.* lanceolate-ensiform, distichous, acute, five lines broad. 1758. SYN. *Ixia bulbifera* (A. B. R. 48; B. M. 545).

S. grandiflora (large-flowered).* *fl.* three to five, alternate; perianth purple, white, or variegated, 2in. long, the segments equal, stellately spreading, oblong-cuneate, rounded at apex; scape simple or dichotomous, terete, leafy, 1ft. to 2ft. high. April. *l.* distichous, lanceolate-ensiform, acute, five lines broad. 1758. (B. M. 779.) SYNS. *Ixia aristata* (A. B. R. 87), *I. grandiflora* (B. M. 541).

S. g. Liliago (Liliago). *fl.*, perianth white, 2in. deep; spathe whitish, sub-diaphanous, equalling the tube. *l.* finely striated, shorter than the stem. (B. R. 258.)

S. g. lineata (red-lined). *fl.*, perianth throat yellow; segments longitudinally marked with a red line, more or less tinged with pink, yellow at base, having a brown mark near the middle, the upper part white; scapes two to four-flowered. *l.* 5in. to 8in. long. (S. B. F. G. ser. ii. 131, under name of *S. lineata.*)

S. g. stellaris (star-like). *fl.*, perianth rich purple, rather paler externally; tube short, filiform, exserted; mouth within of a deeper purple, and surrounded by a broad, irregular, starry, white band. *l.* erect, acute. (S. B. F. G. ser. ii. 383, under name of *S. stellaris.*)

S. pendula (pendulous).* *fl.* lilac, veiny, secund, sessile, within somewhat lacerated spathes; perianth segments oblong, obtuse,

Sparaxis—*continued.*

spreading; spikes on capillary peduncles, one-sided, six or seven-flowered, pendulous, with two capillary leaves at the base of each peduncle; scapes erect 4ft. high, pendulous at the end, branched. June. *l.* linear, acute, straight, shorter than the scapes. 1825. (B. R. 1350.) This species is now regarded by Mr. Baker as belonging to *Dierama*, and its proper name is *D. pendula.*

S. pulcherrima (very pretty). *fl.* pendulous; perianth dark sanguineous-purple, equal, 1½in. long, campanulate; bracts at the base of the branches 1½in. long; scape attaining 6ft. in its native habitat, the branches remote, capillary, 3in. to 6in. long. October. *l.* narrow-ensiform, rather thick, about ¼in. broad, gradually narrowed from below the middle to a very slender apex. 1865. (B. M. 5555; F. d. S. 1810.) *Dierama pulcherrima* is now the correct name of this species.

S. tricolor (three-coloured).* *fl.* three to six, alternate, distant, distichous-spicate; perianth orange, yellow in the throat, the segments oblong, 1in. long, with a triangular, black spot in the middle; spathe valves equal, fuscous-spotted, lacerate-cuspidate; scape 1ft. to 2ft. high, erect, simple, leafy. May. *l.* lanceolate-ensiform, erect, distichous, acute, striated, four lines broad. 1789. (B. M. 1482.) SYN. *Ixia tricolor* (B. M. 381).

S. t. blanda (charming). *fl.*, perianth segments of a whitish ground-colour, flushed with rose, the throat being yellowish. SYN. *S. t. subroseo-albida* (B. M. 1482).

S. t. Griffinii (Griffin's). *fl.*, throat yellow, with a dark blotch between the throat and the violet-purple upper portion of the segments. SYN. *S. t. violaceo-purpurea* (B. M. 1482).

S. t. versicolor (various-coloured). *fl.*, perianth segments bright purple with lighter margins, more or less clouded or diluted, having near the base a dark mark, below which they are bright yellow; spathe striped with brown and purple. (S. B. F. G. 160, under name of *S. versicolor.*)

VARIETIES. The following list comprises the most desirable garden varieties:

ANGELIQUE, white, yellow centre; DELICATA, light yellow, centre spotted brown; GARIBALDI, rich crimson, yellow centre; JOSEPHINE, white, with yellow centre; LADY CAREY, French white, blotched purple; LEOPARD, primrose, yellow centre; MACULATA, white, purple, and primrose; NAIN, white and crimson, primrose centre; TRICOLOR ALBA, white, black, and yellow; TRICOLOR GRANDIFLORA, rich crimson; VICTOR EMMANUEL, red and yellow.

SPARGANIUM (an old Greek name used by Dioscorides, probably for *Butomus*, and derived from *sparganon*, a band; alluding to the form of the leaves). Bur Reed. ORD. *Typhaceæ.* A small genus (less than a dozen species) of marsh or aquatic herbs, inhabiting North temperate regions and Australia. Five species are natives of Britain, but none are of any horticultural value. The stems of *S. ramosum* (Bede Sedge) have been used for making pepper.

FIG. 509. FLOWERING BRANCH OF SPARMANNIA AFRICANA.

SPARMANNIA (named in honour of Dr. Andrew Sparmann, 1748-1820, a Swede, who travelled in South Africa, and afterwards accompanied Captain Cook in his second voyage). ORD. *Tiliaceæ*. A small genus (three species) of softly stellate-pubescent, greenhouse shrubs or trees, natives of tropical or South extra-tropical Africa. Flowers white, with numerous discoloured stamens; sepals and petals four; cymelets terminal, umbelliform; bracts short, involucrate. Leaves cordate, toothed or lobed. *S. africana*, the only species known in cultivation, is a beautiful, quick-growing, arborescent shrub, thriving in a compost of loam and peat. It may be freely increased by cuttings, inserted in sandy peat, under a glass, in heat.

S. africana (African).* African Hemp. *fl.* conspicuous, on elongated, many-flowered peduncles; sepals lanceolate; petals obovate; barren filaments yellow, with purple tips. May. *l.* long-petioled, cordate, acuminate, 5in. to 6in. long, 3in. to 4in. broad, softly hairy on both sides, unequally toothed. Branches terete, patently hairy. *h.* 10ft. to 20ft. South Africa, 1790. See Fig. 509. (B. M. 515.) *S. a. flore-pleno* is a handsome, double-flowered variety.

SPARROW-GRASS. A corruption of *Asparagus*.

SPARROWS. Among gardeners and farmers, Sparrows have long been a bone of contention; but while, a few years ago, the general tendency was to regard them as more useful than harmful, this has, of late years, been changed; and now Sparrows find few to defend them against their many accusers. All are agreed that, at certain seasons, these birds are wholly mischievous. By eating Peas and other seeds in spring, they often ruin the garden produce, or necessitate a second sowing. At a later period, they feed upon the young Peas and other plants, or pick off the buds from Gooseberry-bushes, and other fruit-bearing plants. When seeds are formed, the birds still eat Peas, but chiefly live on the various Cereals (Oats, Wheat, Barley, &c.). It is, however, asserted by the defenders of Sparrows that, in return for these injuries, they do much good by devouring injurious insects and their eggs and larvæ, particularly while there are young birds to be fed in the nests; but examination of the contents of Sparrows' stomachs shows that at no season do insects form more than a very small portion of their food; and that, practically, they do hardly anything to diminish the number of hurtful insects. By far the greater part of their food has been proved to be seeds of Cereals. But not only are Sparrows of little use in destroying hurtful insects; they actually favour the multiplication of the latter in many places, since, by their quarrelsome disposition, they drive away the truly insectivorous birds, whose slender bills and weaker forms do not fit them to fight with Sparrows for their nests. The insectivorous birds must feed on insects or starve; hence they are very useful, and they cannot injure the produce of a garden. Therefore, to have them driven away is a serious evil. Swallows and window martins are peculiarly liable to be ousted by Sparrows. Where the last-named have been kept down, it has been observed that the swallows and martins soon become more numerous, and insects cease to be troublesome. The results of inquiries in America and in Australia quite agree with the above statements; and a war of extermination has been strongly urged, though, of late, the hostility to them has been lessened in New York as they have developed a taste for *Cicada septem-decim*. In England, strenuous efforts are now made in many districts to limit the number of Sparrows, by shooting the birds, and by removing the nests and eggs wherever accessible. These measures can be persevered in by owners and occupiers of land, and by those whom they authorise, even during the "close time," *i.e.*, from 1st March to 1st August, without infringing the Wild Birds Protection Acts, 1880, 1881.

For fuller information, the reader is referred to a work entitled "The House Sparrow and the English Sparrow in America," by Messrs. Gurney, Russell, and others, 1885.

SPARTIANTHUS. A synonym of **Spartium** (which *see*).

SPARTINA (from *spartine*, a cord; alluding to the use of the foliage). SYNS. *Limnetis, Ponceletia, Solenachne, Trachynotia*. ORD. *Gramineæ*. A genus comprising six or seven species of stove, greenhouse, or hardy, maritime grasses; two are broadly dispersed over the shores of Europe, America, and Africa, two or three are North American, one is a native of extra-tropical South America, and one is found in Tristan d'Acunha and Amsterdam Island. Spikelets one-flowered; spikes at the sides of a terminal, erect peduncle, sometimes clustered in a long and dense, spike-like panicle, sometimes narrow and scattered. Leaves convolute-terete or esplanate at base. The genus, which is represented in Britain by *S. alternifolia, S. stricta* (Cord Grass; Mat Weed, &c.), and *S. Townsendi*, has no horticultural merit.

SPARTIUM (the old Greek name used by Dioscorides, and derived from *sparton*, cordage; the twigs of the plant, by maceration, produce a good fibre, which is sometimes made into thread). SYN. *Spartianthus*. ORD. *Leguminosæ*. A monotypic genus. The species is a hardy, deciduous shrub, with Rush-like and often leafless branches. It is a very ornamental plant when in blossom, and consequently is well adapted for shrubberies. Any ordinary soil is suitable. Propagation is usually effected by seeds, which ripen in abundance. Young cuttings will root, if covered with a hand glass.

S. junceum (Rush-like).* Rush or Spanish Broom. *fl.* yellow, fragrant, showy, disposed in terminal racemes; calyx somewhat spathaceous; standard ample; wings obovate; keel incurved, acuminate; bracts and bracteoles minute, highly caducous. July to September. *l.* rare, one-foliolate; stipules wanting. *h.* 6ft. to 10ft. Mediterranean region and Canary Isles, 1548. (B. M. 85; S. F. G. 671; B. R. 1974, under name of *S. acutifolium*.) There is a double form in cultivation.

SPARTOTHAMNUS (from *sparton*, cordage, and *thamnos*, a branch; alluding to the use of the plant). ORD. *Verbenaceæ*. A monotypic genus. The species is a pretty, glabrous or pubescent, evergreen shrub or subshrub. It requires the temperature of a cool, airy greenhouse. A compost of sandy peat and loam is most suitable for its culture. Propagated by cuttings, inserted in sand, under a glass.

S. junceus (Rush-like). *fl.* white, very small, solitary in the axils, with small bracteoles; calyx and corolla five-lobed. August. *l.* small and distant, often reduced to small scales, all opposite; when fully developed ¼in. to ½in. long, lanceolate or ovate-lanceolate. Branches divaricate, acutely four-angled, Broom-like and appearing almost leafless. *h.* 2ft. Australia, 1819.

SPATALANTHUS. Included under **Romulea** (which *see*).

SPATALLA (from *spatalos*, delicate; in allusion to the nature of the flowers). ORD. *Proteaceæ*. Of this genus seventeen species have been described; they are greenhouse, Heath-like shrubs, restricted to South Africa. Flowers rather small, solitary under the bracts, capitate, sessile or shortly pedicellate, forming a loose spike or terminal raceme; perianth slender, scarcely dilated towards the base, the limb straight or incurved, ovoid or oblong; hypogynous scales four, subulate. Nuts often pubescent or villous. Leaves scattered, filiform or subulate, undivided. A selection of the species known to cultivation is here given. They all have purple flowers and require similar treatment to **Protea** (which *see*).

S. incurva (incurved). *fl.*, involucre three or four-flowered, pubescent, four-leaved; racemes solitary or often aggregate, peduncular, 1in. to 2in. long. May. *l.* rather loosely spreading, ½in. to 1in. long, incurved, slender, bristly-mucronate, scarcely attenuated at base, glabrous; young ones, and branchlets, slightly pilose. *h.* 2ft. 1789.

S. mollis (soft). *fl.*, involucre villous, two-leaved; spike solitary, sessile, erect, dense, oblong-cylindrical, branched, scarcely 1in. long. June. *l.* erecto-patent, seven to eight lines long, straight, and, as well as the slender branchlets, silky-villous. *h.* 2ft. 1826.

S. nivea (snowy). *fl.*, involucre campanulate, one-third the length of the perianth; spike sub-sessile, erect, dense, imbricated, 1in.

Spatalla—*continued.*

to 1½in. long. June. *l.* imbricated, eight to ten lines long, slender, acute, straight or slightly curved; younger ones (and branches) slightly silky-pilose. *h.* 2ft. 1806.

S. pedunculata (long-peduncled). *fl.*, claw tomentose; involucre sub-campanulate, bilabiate, cano-tomentose, at length glabrescent; spike solitary, 1in. to 2in. long, at length rather loose; peduncle 1in. to 1½in. long, with a few adpressed, carinate-subulate bracts. April. *l.* much incurved, nearly 1in. long, triquetrous-filiform, rather obtuse, much attenuated at base, incurved-falcate above; young ones straight, slightly silky-pilose. *h.* 2ft. 1822.

S. prolifera (proliferous). *fl.*, involucre sub-sessile, four-leaved; spikes sessile, conico-capitate, leafy-bracted. July. *l.* erect, or at length spreading, clustered, imbricated, five to eight lines long, slender, straight or scarcely incurved, setaceous-mucronulate; younger ones (and branchlets) silky. Branches reddish, nearly glabrous. *h.* 2ft. 1800.

S. pyramidalis (pyramidal). *fl.* yellowish-pubescent; involucre shortly pedicellate, pubescent, four-leaved; spike 1in. to 1½in. long, solitary, sessile, erect, oblong-pyramidal, dense, sometimes branched at the base. June. *l.* much crowded, erecto-patent, six to ten lines long, slender, very acute, straight, at length slightly recurved, slightly pilose. Branchlets umbellate. *h.* 3ft. 1821.

SPATHACEOUS. Bearing, or having the nature of, a spathe.

SPATHANTHEUM (from *spathe*, a spathe, and *anthos*, a flower; the flowers are seated on the midrib of the spathe). Including *Gamochlamys*. ORD. *Aroideæ* (*Araceæ*). A small genus (two species) of stove, tuberous-rooted perennials; one is found in Bolivia, and the other is a native of Africa. Flowers spread over the whole length of an inappendiculate, semi-cylindrical spadix, adnate to, and shorter than, the spathe, monœcious, all perfect; spathe oblong-lanceolate, acuminate, membranous, at length opening, longitudinally nerved and reticulated, persistent; peduncle slender, nearly equalling the leaves. Leaves on long and slender petioles, cordate or sagittate-ovate, entire or pinnatifid-lobed. *S. heterandrum* (the only species in cultivation) thrives in a well-drained soil, composed of rich loam and peat. Plenty of water is necessary during the growing season. Propagation may be effected by offsets, or by division of the tubers.

S. heterandrum (various-anthered). *fl.*, spathe green, fleshy, boat-shaped, acute, 4in. to 5in. long; spadix half as long as the spathe, adnate through its whole length; peduncle rather shorter than the petiole, firm, erect, sub-terete. *l.* cordate-ovate, bright green, glabrous, rather fleshy, 1ft. long, deeply pinnatifid, the divisions acute; petioles 2ft. long. Rootstock bearing a solitary leaf. Africa, 1876. SYN. *Gamochlamys heterandra.*

SPATHE (from *spathe*, a broad blade; in allusion to its form in most Palm-trees). A large bract, situated on the flower-stalk below the inflorescence, and surrounding the latter until the flowers are ready to open. There may be only one bract for each inflorescence (*e.g.*, *Narcissus*, *Arum*, &c.); but often (in many Palms) there are two or more, the outer ones being smaller and open at the top, and hence called incomplete. Spathes vary in texture, from membranous (*Narcissus*) to leafy (*Arum*, see Fig. 507, page 463), or fleshy, or woody, as in many of the larger Palms (*Cocos*, *Maximiliana*, &c.), in which the part that incloses the flowers may reach a length of over 3ft., and a thickness of over ½in.

SPATHEGASTER. A group of Gall-flies, that form galls on Oak. Most conspicuous of these is the Currant Gall, so common in the early summer on the male catkins, and on leaves, of the common Oak, throughout Britain. The experiments of Dr. Adler, and of other entomologists, have, of late years, given grounds for the belief that the insects originally grouped in the genus *Spathegaster*, are only stages in the development of what were formerly regarded as distinct species of a different genus, *Neuroterus*, which make galls in autumn, very different from those of *Spathegaster* in appearance. For an account of what are now believed to be the relations between the insects and galls, *see* **Oak Galls.**

SPATHELIA (from *spathe*, a Palm-tree; alluding to the similarity of habit). ORD. *Simarubeæ*. A genus comprising only three species of tall and showy, stove, evergreen trees, with simple trunks, inhabiting the West Indies. Flowers rather large, shortly pedicellate, disposed in ample, terminal, elongated, branched panicles, the ultimate branchlets of which are sub-cymose; calyx five-parted; petals five, scarcely longer than the calyx, imbricated; stamens five. Leaves alternate, imparipinnate, many-jugate; leaflets alternate, linear-oblong or sickle-shaped, sub-entire or serrated, the margins gland-bearing. *S. simplex*, the only species introduced to cultivation, thrives in a compost of loam and peat; it may be increased by ripened cuttings, inserted in sand, under a glass, in heat.

S. simplex (simple). May Pole, Mountain Green, or Mountain Pride of the West Indies. *fl.* red; panicle powdery, spreading, several feet long. April. *l.* twenty to forty-jugate, puberulous and glabrate beneath, oblong-lanceolate or linear-lanceolate, acuminate, or falcate, crenate or quite entire; leaflets very variable, opposite or alternate, sessile or petiolulate, crenated or entire. Stem slender, resembling that of a palm, 20ft. to 50ft. high. 1778. (B. R. 670.)

SPATHELLA (a diminutive of *spathe*). The name given to the numerous small bracts that, on the spadices of *Calamus*, and allied genera of Palms, replace the one or few large spathes met with among the other Palms.

SPATHICARPA (from *spathe*, a spathe, and *karpos*, fruit; the ovaries are seated along the midrib of the spathe). ORD. *Aroideæ* (*Araceæ*). This genus embraces eight species of stove, evergreen, tuberous-rooted herbs, natives of Brazil and Paraguay. Flowers all perfect, the males and females longitudinally disposed in a few series, along the semi-cylindrical, inappendiculate spadix; spathe oblong-lanceolate, acuminate, membranous, at length opening, convolute at base and apex, persistent; peduncles slender, exceeding the leaves. Leaves membranous, lanceolate, or hastate- or sagittate-cordate, or hastately trisected; petioles elongated, long-sheathing. Only a couple of the species have been introduced. These thrive in rich, sandy loam; they may be multiplied by divisions, or by seeds.

S. hastifolia (hastate-leaved). *fl.*, spathe greenish, elegantly acuminate; spadix elongated. *l.* tripartite; middle part oblong-ovate, acuminate; lateral ones oblong or ovate-lanceolate, slightly acute; petioles twice or thrice as long as the blades. *h.* 1ft. Minas Geraes.

S. longicuspis (long-cuspidate). A synonym of *S. sagittifolia.*

S. sagittifolia (sagittate-leaved). *fl.*, spathe green, long-decurrent at base, long or rarely short-cuspidate; spadix slender, scarcely shorter than the spathe. *l.* sagittate; anterior lobe ovate-lanceolate, slightly elongated; posterior lobe retrorse, spreading, obtuse; petioles nearly twice as long as the blades. *h.* 6in. to 12in. Bahia, 1860. SYN. *S. longicuspis.*

S. s. platyspatha (broad-spathed). *fl.*, spathe dilated towards the apex, shortly cuspidate. *l.* sagittate, deeply cordate at base.

SPATHIPHYLLUM (from *spathe*, a spathe, and *phyllon*, a leaf; alluding to the leaf-like spathe). Including *Amomophyllum* and *Massovia*. ORD. *Aroideæ* (*Araceæ*). A genus embracing about twenty tropical American, and two Malayan, species of almost stemless, stove, evergreen, perennial herbs. Flowers all fertile, dense; spathe leaf-like, membranous, oblong or lanceolate, acute, acuminate, or caudate-acuminate, at length broadly expanded, accrescent and persistent; spadix shorter than the spathe, sessile or stipitate, the stalk sometimes adnate to the spathe, cylindrical. Leaves oblong or lanceolate, acuminate or cuspidate; petioles elongated, long-sheathing, usually geniculate at apex. Several of the species have been introduced, and are here described. Equal parts of leaf mould and peat, mixed with a little loam and small pieces of charcoal, form a suitable compost for Spathiphyllums. They require a moist atmosphere and an abundance of water. Propagation is sometimes effected by seeds, sown on a hotbed, but chiefly by divisions of the rootstock. "For decorative purposes, some of the smaller species, such as *S. candidum*,

Spathiphyllum—*continued.*

S. cannæfolium, *S. floribundum*, and *S. Patini*, are very useful, and form a very effective contrast with *Anthurium Andreanum* and *A. Scherzerianum*" (N. E. Brown).

S. candidum (white).* *fl.*, spathe pure white, ovate, acuminate, about 3½in. in length; spadix white, slender, straight, cylindrical; flowering peduncle often knee-jointed just below the spathe. *l.* ovate-lanceolate, attenuately acuminate, 6in. to 8in. long, on slender, erect petioles. *h.* 9in. Columbia, 1875. Closely allied to *S. Patini*. SYN. *Anthurium candidum*.

S. cannæfolium (Canna-leaved).* *fl.*, spathe white, lanceolate- or elliptic-oblong, sub-sessile, scarcely decurrent, shortly cuspidate, 6in. long, 2in. broad; spadix white, 5in. long, 3in. broad. *l.* ovate- or elliptic-oblong, shortly acuminate; petioles equalling or exceeding the blades, sheathed scarcely to the middle. *h.* 1ft. Venezuela, Guiana, and Brazil. (R. G. 640.) SYNS. *S. cannæforme*, *Anthurium Dechardi* (I. H. 269), *Pothos cannæfolia* (B. M. 603; L. B. C. 471).

S. cannæforme (Canna-like). A synonym of *S. cannæfolium*.

S. cochlearispathum (spoon-spathed). *fl.*, spathe green, 1ft. long, ovate or oblong-ovate, produced into a long-cuspidate point; spadix whitish. *l.* broadly oblong, undulated, upwards of 3ft. long and 1ft. wide, rounded or sub-cordate at base, lustrous-green; petioles nearly equalling the blades. *h.* 4ft. Mexico, 1875. SYN. *S. heliconiæfolium* (L. H. 189).

S. commutatum (changed). *fl.*, spathe white, oblong-lanceolate, nearly flat, cuspidate; spadix white, short, oblong; peduncles tall, shortly decurrent. *l.* ovate-oblong, deep green; petioles shorter than the blades. *h.* 2½ft. Philippines, 1870. A rather elegant plant, rivalling in beauty the well-known African or Trumpet Lily. (R. G. 637, f. 1-3, under name of *S. Minahassæ*.)

S. floribundum (bundle-flowered). *fl.*, spathe ivory-white, 2in. long, oblong-lanceolate, with an elongate-cuspidate acumen; spadix white, stipitate, scarcely shorter than the spathe; peduncles much exceeding the petioles. *l.* oblong-elliptic or oblong-lanceolate, acuminate and very acute, inequilateral, paler beneath; peduncles nearly equalling the blades. *h.* 1ft. New Grenada, 1874. (I. H. 159, under name of *Anthurium floribundum*.)

S. heliconiæfolium (Heliconia-leaved). A synonym of *S. cochlearispathum*.

S. hybridum (hybrid). A garden hybrid between *S. cannæfolium* and *S. Patini*, and quite intermediate in character. The spathe is as large as in the first-named parent, and whiter on both sides. (B. H. 1885, p. 89; G. C. xix. p. 500; I. H. 450.)

S. Ortgiesii (Ortgies'). *fl.*, spathe bright green, oblong-elliptic; spadix white, oblong, the stalk connate with the base of the midrib. *l.* broadly elliptic or elliptic-oblong, undulated; petioles broadly winged. *h.* 1½ft. Mexico, 1873. (R. G. 738.)

S. Patini (Patin's). *fl.*, spathe whitish, except the green midrib, oblong-lanceolate, very long-acuminate, spreading or reflexed; spadix whitish, straight, obtuse, rather long-stipitate, a little shorter than the spathe; peduncles equalling or exceeding the leaves. *l.* elongate-lanceolate, long-narrowed to both ends, very acute, deflexed, inequilateral, pale green; petioles twice as long as the blades, erect, slender, terete. *h.* 9in. New Grenada, 1874. (I. H. 397.) SYNS. *Amomophyllum Patini*, *Anthurium Patini* (G. C. n. s., iii. p. 525).

S. pictum (painted).* *l.* somewhat fleshy, broadly ovate-elliptic, 1½ft. or more long, glossy dark green, mottled along the course of the transverse veins, with blotches of golden-green. South America, 1874. An ornamental plant, in habit resembling a Dieffenbachia. The proper name of this plant is *Rhodospatha picta*.

S. Wallisii (Wallis'). *fl.* spathe of a pleasing green, 5½in. long, oblong-elliptic, rounded and decurrent at base, long-cuspidate at apex; spadix cylindrical, one-third the length of the spathe. *l.* 6in. to 9in. long, oblong-lanceolate, rounded or cuneate at base, cuspidate at apex, the margins slightly crenate-crisped; petioles 5in. to 8in. long. New Grenada. (R. G. 920.)

SPATHIUM (of Edgworth). A synonym of *Aponogeton*.

SPATHIUM (of Loureiro). A synonym of **Saururus** (which *see*).

SPATHODEA (from *spathe*, a spathe; referring to the form of the calyx). ORD. *Bignoniaceæ*. A monotypic (?) genus. *S. campanulata* is a noble, stove, evergreen tree, requiring culture similar to **Bignonia** (which *see*). *See also* **Newbouldia.**

S. campanulata (bell-shaped). *fl.* orange, in a short, terminal, slightly-branched raceme; calyx long, spathe-like, densely tomentose; corolla campanulate, 3in. long, 2½in. in diameter, with a sub-bilabiate limb of five broad lobes. June. *l.* ample, pinnate; leaflets lanceolate, petiolulate, entire. *h.* 50ft. Tropical Africa, 1858. (B. M. 5091; F. d. S. 830; L. & P. F. G. 104; L. J. F. 388.)

S. lævis (smooth-leaved). A synonym of *Newbouldia lævis*.

SPATHOGLOTTIS (from *spathe*, a spathe, and *glottis*, a tongue; in allusion to the form of the lip). Including *Paxtonia*. ORD. *Orchideæ*. A genus comprising about ten species of mostly stove, terrestrial orchids, natives of the East Indies, South China, the Malayan Archipelago, the Pacific Islands, and Australia. Sepals free, sub-equal, spreading; petals similar, sometimes broader or longer; lip sessile at the base of the column, concave or saccate at base, deeply three-lobed, the middle lobe contracted at the base, and bearing prominent tubercles or calli; pollen masses eight, of which four are usually smaller; bracts erect or deflexed; racemes on erect scapes, leafless, except sheathing scales. Leaves on the caudex solitary or twin, elongated; petioles at length more or less thickened into pseudo-bulbs or tubers. The best-known species are here described. They require similar treatment to **Bletia** (which *see*).

S. aurea (golden). *fl.* golden-yellow, marked on the lip with a few dark blood-coloured spots, large, about six borne at the very end of the scape. July. *l.* narrow, resembling those of a Phaius. *h.* 2ft. Malacca, 1849. A rather handsome species.

S. Fortunei (Fortune's).* *fl.* yellow; sepals ovate, obtuse; petals broader, oblong, sub-sessile; lateral segments of lip blotched with red, oblong, erect, the middle one cuneate and emarginate; column remarkably long and narrow; raceme secund, pubescent; bracts acuminate. January. *l.* twin, lanceolate-linear, longer than the pubescent scape. Hong Kong. Greenhouse. (B. R. 1845, 19.)

S. Lobbii (Lobb's). *fl.* sulphur-yellow, about 1in. in diameter, long-stalked; lateral sepals streaked with three or four brown lines; petals broader than the sepals; raceme loose; scape slender, firm, loosely hairy. Burmah, 1876. (G. C. n. s., xviii. p. 532.)

S. pacifica (Pacific). *fl.*, sepals and petals whitish-lilac, with darker markings; lip lilac, edged with yellow, the two side lobes blunt, curved; front lobe stalked, reniform, undulated, with an orange disk, the stalk having two white tubercles on its base. *l.* oblong-lanceolate. Pseudo-bulbs conical. Pacific Islands, 1883.

S. Petri (Peter Veitch's).* *fl.*, sepals ligulate, acute, and, as well as the much broader petals, dark lilac in colour; lip trifid, purple, with a white disk and a rhomboid callosity, having three furrows and two lines of long hairs between the side lobes, ochre-yellow; bracts large and conspicuous; scape 2ft. long, green, becoming purplish at the top. *h.* 2ft. South Sea Islands, 1877. An interesting plant. (B. M. 6354.)

S. plicata (folded). *fl.* purple; sepals spreading; petals obtuse, connivent; lateral segments of lip truncate, cuneate-oblong, the middle one clawed, with two tubercles at base; bracts petaloid, lanceolate, coloured; scape sometimes 2ft. high and many-flowered, sometimes 1½ft. high and two-flowered. June. *l.* many, ensiform, plicate. Java, &c., 1844.

S. pubescens (downy). *fl.* dirty-yellow, slightly violet at the base of the lip; sepals acute; petals obtuse; lateral lobes of lip erect, the middle one three-keeled, with two tubercles at base; raceme two to eight-flowered, secund; scape ascending, pubescent, 1½ft. long. June. *l.* twin, linear-lanceolate, acuminate at both ends, shorter than the scape. Tubers as large as hazel nuts. Sylhet.

S. rosea (rose-coloured).* *fl.* rose-coloured, pretty, about 1½in. across; sepals and petals oblong, acute; bracts spreading, as long as the pedicels; scape erect, slender, distantly sheathed, taller than the leaves. July. *l.* lanceolate, plicate, narrowed at base, nearly 2ft. long. Pseudo-bulbs densely aggregated, three-leaved. Philippines, 1837. SYN. *Paxtonia rosea*. (B. R. 1838, 60.)

S. tomentosa (tomentose). *fl.* crimson; sepals and petals very obtuse; lateral segments of the lip erect, truncate; middle one reniform at apex, the claw elongated; raceme twenty-flowered; bracts and scape coated with a close fur. June. *l.* twin, broadly lanceolate, longer than the scape. Manilla.

SPATHOTECOMA. A synonym of **Newbouldia** (which *see*).

FIG. 510. SPATHULATE AND APICULATE LEAF.

SPATHULATE, SPATULATE. Oblong, with the lower end attenuated; shaped like a druggist's spatula. A Spathulate and apiculate leaf is shown at Fig. 510.

SPATHYEMA. A synonym of **Symplocarpus** (which *see*).

SPATULARIA (of Haworth). Included under **Saxifraga** (which *see*).

SPAWN, MUSHROOM. The underground, vegetating part of the plants of which Mushrooms are the parts devoted to the reproduction of the species. It consists of white threads of mycelium growing among masses of decaying animal or plant remains; *e.g.*, in old hotbeds, in stable-yard manure, in droppings of horses or cattle, &c. In artificially-prepared Spawn, the mycelium grows in firm and brick-shaped, or loose, masses of the food (dung, &c.), penetrating into all parts of these, and filling them with the white cells of which it is composed. If kept dry, Mushroom Spawn will remain unchanged for years; but, when a piece of it is placed in a moist bed of manure, or other suitable food, at a temperature of about 60deg. Fahr., growth goes on vigorously. The new food is traversed by mycelium, and, in a short time, Mushrooms begin to grow upon the surface of the bed. Thus the Spawn does not correspond to seed, but rather may be compared, in its mode of reproducing the species, with the tubers, or so-called *seed*, of potatoes. For the mode of preparing and using Spawn in the artificial cultivation of Mushrooms, *see* **Mushrooms.**

SPEARMINT. *See* **Mentha viridis** and **Mint.**

SPEARWORT. A name applied to several species of *Ranunculus.*

SPECIES. "A Species comprises all the individual plants which resemble each other sufficiently to make us conclude that they are all, or may have been all, descended from a common parent. These individuals may often differ from each other in many striking particulars, such as the colour of the flower, size of the leaf, &c., but these particulars are such as experience teaches us are liable to vary in the seedlings raised from one individual" (Bentham).

SPECKLINIA. Included under **Pleurothallis** (which *see*).

SPECULARIA (from *Speculum Veneris*, Venus' Looking-glass, the early name of the common European species). SYNS. *Apenula, Legouzia, Prismatocarpus* (in part). ORD. *Campanulaceæ.* A genus comprising about eight species of hardy, erect or decumbent, hispid or glabrous herbs, natives of the Northern hemisphere, one being also found in South America. Flowers sessile or shortly pedunculate in the axils, bibracteate, the upper ones panicled; calyx five-parted; corolla blue, violet, or white, sub-rotate or broadly campanulate, five-lobed; stamens free of the corolla, the filaments flat. Leaves alternate, entire or toothed. The genus is represented in Britain by *S. hybrida.* For culture of the four species described below, *see* **Campanula.**

S. hybrida (hybid). Corn Violet. *fl.* sub-sessile; calyx longer than the floral leaves, shortly angled; corolla blue within, lilac outside, cleft to near the middle. June to September. *l.* small, oblong, waved; radical ones on broad petioles, ovate or spathulate; cauline ones sessile. Stem 6in. to 10in. long, erect or decumbent. Europe (Britain), &c. (Sy. En. B. 874, under name of *Campanula hybrida.*)

S. pentagonia (five-angled). *fl.* blue; calyx shorter than, or as long as, the corolla, with spreading lobes. July. *l.*, lower ones obovate, entire; the others ovate-oblong or lanceolate, nearly entire. Stem branched. *h.* 1ft. Levant, 1686. (B. R. 56, under name of *Campanula pentagonia.*)

S. perfoliata (perfoliate). Venus' Looking-glass of North America. *fl.* sessile, solitary or two or three together; the upper or later ones only with a conspicuous purplish-blue corolla. May to August. *l.* roundish or ovate, clasping by the heart-shaped base, toothed. *h.* 3in. to 20in. North America, 1680.

S. Speculum. Speculum Veneris; Common Venus' Looking-glass. *fl.* purple; calyx glabrous or pubescent, as long as the corolla, the lobes at length reflexed. July. *l.* similar to those of *S. pentagonia.* Stem branched; branches three-flowered. *h.* 1ft. Europe, 1596. (B. M. 102 and S. F. G. 216, under name of *Campanula Speculum.*)

SPEEDWELL. *See* **Veronica.**

SPEIRANTHA (from *speira*, a coil, and *anthos*, a flower; in reference to the inflorescence). ORD. *Liliaceæ.* A monotypic genus. The species is a highly glabrous, stemless, greenhouse plant, with an oblique, thick, stoloniferous rhizome. It was formerly classed under **Albuca** (which *see* for culture).

S. convallarioides (Convallaria-like). *fl.*, perianth white or greenish, about ½in. long, six-parted; stamens six; racemes twenty to thirty-flowered, 1in. to 2in. long; scape slender, 3in. to 4in. long. June. *l.* six to eight in a rosette, sub-erect, oblanceolate, sessile, 5in. to 6in. long, 1in. to 1½in. broad, acute. China, 1854. SYN. *Albuca Gardeni* (B. M. 4842).

SPELT. *See* **Triticum Spelta.**

SPERAGE. An old name for *Asparagus.*

SPERGULA PILIFERA. A synonym of *Sagina pilifera.*

SPERLINGIA. A synonym of **Hoya** (which *see*).

SPERMACOCE (from *sperma*, a seed, and *akoke*, a point; probably alluding to the pointed calyx teeth on the fruit). Button Weed. Including *Bigelovia* (of Sprengel). ORD. *Rubiaceæ.* A large genus (about 150 species) of stove, greenhouse, or hardy, low, annual or perennial herbs or sub-shrubs, scattered over tropical and sub-tropical regions. Flowers white, pink, or blue, small or minute, sessile, solitary and axillary, or in fascicles, cymes, heads, or whorls. Leaves opposite, sessile or stalked, membranous or coriaceous. The species, several of which have been introduced, have little horticultural value. **Borreria** (which *see*) is included here by the authors of the "Genera Plantarum."

SPERMADICTYON. A synonym of **Hamiltonia** (which *see*).

SPERMAXYRUM. A synonym of **Olax** (which *see*).

SPERMUM. This term, used in Greek compounds, denotes a seed or any seed-like part, *e.g.*, Macrospermum, large-seeded; Polyspermum, many-seeded.

SPHACELE (from *Sphakos*, the Greek name of Sage, which these plants resemble in foliage). SYN. *Phytoxis* (of Sprengel). ORD. *Labiatæ.* A genus of about twenty species of stove or greenhouse shrubs or sub-shrubs; one is a native of the Sandwich Islands, and the rest are mostly Western American, extending from Brazil and Chili to California. Flowers red, violet, blue, or whitish; calyx five-toothed; corolla tube ample; limb short, scarcely bilabiate, four-cleft, with broad, erecto-patent lobes; stamens four; whorls loosely two to six-flowered, or densely six to many-flowered, racemose or spicate. Nutlets ovoid, smooth. Leaves often bullate-wrinkled, and canescent beneath; floral ones reduced to bracts. Three species have been introduced, all requiring greenhouse heat. For culture, *see* that advised for the tender species of **Salvia.**

S. cærulea (blue). *fl.* pale lavender-blue, disposed in numerous spikes. *l.* ovate, serrated. 1866. A soft-wooded, winter-blossoming sub-shrub. (F. M. 281.)

S. campanulata (bell-shaped). *fl.*, calyx four lines long; corolla pale bluish, nearly eight lines long, with broad, crenulated lobes; whorls two-flowered; racemes loose, secund. July. *l.* shortly petiolate, oblong-lanceolate, ½in. to nearly 1in. long, narrowed at base; uppermost ones much wrinkled. *h.* 2ft. to 3ft. Chili, 1795. Shrub. (B. R. 1382.)

S. Lindleyi (Lindley's). *fl.*, corolla purplish-violet, twice as long as the calyx, pubescent outside, slightly incurved; whorls many-flowered; raceme simple, dense. July. *l.* ovate, 1½in. to 3in. long, cordate at base, much bullate-wrinkled, white-woolly beneath. *h.* 3ft. to 4ft. Chili, 1825. Shrub. (B. M. 2993.) SYN. *Stachys Salviæ* (B. R. 1226).

SPHÆRALCEA (from *sphaira*, a globe, and *Alcea*, Marsh Mallow; the carpels are disposed in a round head). Globe Mallow. SYNS. *Phymosia, Sphæroma.* ORD. *Malvaceæ.* A genus comprising about twenty-five species of ornamental, stove, greenhouse, or hardy herbs, sub-shrubs,

Sphæralcea—*continued.*

or shrubs, in habit resembling *Malva* or *Malvastrum*; four are natives of the Cape of Good Hope, and the rest inhabit the warmer regions of America. Flowers violet (rarely red) or flesh-coloured, shortly pedicellate (rarely long-pedunculate), solitary or fascicled, axillary, or disposed in terminal racemes or spikes; calyx five-cleft; staminal column more or less divided near the summit into numerous filaments; bracteoles three, free or coalescing at base. Leaves generally angled or lobed. The species described below thrive in a rich, well-drained, loamy soil, and like a light, airy place near the glass. They are readily increased by cuttings of the young growths, inserted in sandy soil, under a bell glass, and kept shaded until rooted.

S. abutiloides (Abutilon-like). *fl.* rose-coloured; calyx twice exceeded by the petals; peduncles axillary, one to five-flowered. August. *l.* roundish, angular-lobed, serrated. *h.* 4ft. Bahamas, 1725. Greenhouse shrub. (B. M. 2544, under name of *Malva abutiloides.*)

S. acerifolia (Maple-leaved). *fl.* pink; peduncles aggregated, terminal. July. *l.* five-lobed, sub-cordate; lobes acute, dentate or unequally serrate. *h.* 4ft. North-west America, 1861. A half-hardy, stellate-pubescent shrub. (B. M. 5404.)

S. angustifolia (narrow-leaved). *fl.* pink; peduncles axillary, solitary or in pairs, one or few-flowered; involucral leaflets bristly, deciduous. August and September. *l.* lanceolate, toothed, powdery. *h.* 3ft. to 4ft. Mexico, 1780. Greenhouse shrub. (B. M. 2839, under name of *Malva angustifolia.*)

S. elegans (elegant).* *fl.* pale, with dark purple veins, from the axils of the upper leaves, usually on short, simple stalks. July. *l.* rather distant, deeply three-lobed or three-parted, on petioles of their own length; lobes cuneate, inciso-pinnatifid, undulated, stellate-tomentose, bluntly toothed. Stems numerous, procumbent or spreading, 2ft. or more long. South Africa, 1791. Greenhouse sub-shrub.

S. miniata (vermilion).* *fl.* vermilion; peduncles axillary, racemose, few-flowered, but sometimes only one-flowered. May to July. *l.* ovate, three-lobed, toothed, tomentose. Stems erect. *h.* 1ft. South America, 1798. Greenhouse sub-shrub. (B. M. 5938; S. B. F. G. ser. ii. 120.)

S. nutans (nodding). *fl.* reddish-purple, nodding; peduncles axillary, usually three-flowered, exceeding the leaves; involucral bracts subulate. July. *l.* cordate, five-lobed, unequally crenate-toothed, stellate-tomentose; lobes very acute; stipules filiform. Stem branched. *h.* 2ft. Guatemala (?), 1852. Stove shrub. (F. d. S. 726; L. & P. F. G. iii. p. 173.)

S. obtusiloba (obtusely-lobed). *fl.* crowded; petals purple, obcordate, with rather dark claws; involucre of three linear leaflets; peduncles axillary and terminal, corymbosely racemose, many-flowered. July. *l.* cordate, somewhat five-lobed, crenate; lobes very blunt. *h.* 3ft to 4ft. Chili, 1827. A stellate-tomentose, greenhouse shrub. (B. M. 2787, under name of *Malva obtusiloba.*)

S. umbellata (umbellate). *fl.* of a fiery-violet colour, large; involucral leaflets obovate, somewhat stipitate, deciduous; peduncles axillary, umbelliferous. January to April. *l.* subpeltate, five-lobed, obtuse. *h.* 10ft. Mexico, 1814. Stove shrub. (L. B. C. 222; B. R. 1608, under name of *Malva umbellata.*)

SPHÆRENCHYMA. Spheroidal or spherical, cellular tissue, such as is found in the pulp of fruits.

SPHÆRIACEÆ. A large family of Fungi, belonging to the division of **Pyrenomycetes** (which *see*), provided with perithecia, of leathery or carbonaceous texture, distinct from the stroma, or mycelium, which open by a round hole or pore, sometimes in the wall of the perithecium, but sometimes at the end of a long neck. In this group are various species hurtful to cultivated plants (*see* **Pleospora**). Several of them show pleomorphism very clearly. Formerly, the family was held to include certain other smaller groups that are now regarded as families distinct from it (*e.g.*, *Dothidiaceæ*, with fleshy, and often bright-coloured, perithecia), to which belong various species (*e.g.*, *Polystigma rubrum* on Plum-leaves) that destroy living plants. The spores and sporidia in *Sphæriaceæ* vary greatly in different genera in complexity of structure, and in the modes of production.

SPHÆROCARPUS. A synonym of *Globba.*

SPHÆROCARYA. A synonym of **Pyrularia** (which *see*).

SPHÆROCHLOA. A synonym of *Eriocaulon.*

SPHÆROCIONIUM. Included under *Hymenophyllum.*

SPHÆROGYNE. Included under **Tococa** (which *see*).

SPHÆROLOBIUM (from *sphaira*, a sphere, and *lobos*, a pod; alluding to the globular pods). ORD. *Leguminosæ.* A genus comprising thirteen species of greenhouse, evergreen, glabrous shrubs or under-shrubs, with Rush-like stems, generally leafless, restricted to Australia. Flowers yellow or red, disposed in terminal racemes, or in lateral racemes or clusters; calyx lobes imbricated, the two upper ones falcate, united; petals with short claws; standard orbicular or reniform, emarginate; wings rather shorter. Pods small, oblique, globular, or compressed. Leaves, when present, narrow, entire, alternate or irregularly opposite or whorled. Two of the species have been introduced: these succeed in a compost of loam and peat. Propagation may be freely effected by young cuttings, inserted in sand, under a glass.

S. acuminatum (taper-pointed). A synonym of *S. medium.*

S. medium (intermediate). *fl.* red or orange, usually numerous, densely clustered in terminal racemes; standard orbicular, rather longer than the calyx. Summer. *l.* on the barren branches small, subulate, often opposite or in whorls of three. Stems erect, 1ft. to 2ft. high; flowering ones leafless. 1803. SYN. *S. acuminatum.*

S. vimineum (twiggy). *fl.* yellow, numerous, usually clustered two or three together along the smaller branches, forming dense or interrupted, terminal racemes; petals about twice as long as the calyx; pedicels very short. Summer. Stems ascending or erect, from a few inches to 2ft. high, with slender, wiry branches; all leafless, or the barren ones bearing a few scattered, linear or narrow-lanceolate leaves, ¼in. long. 1802. (B. M. 969; L. B. C. 1753.)

SPHÆROMA. A synonym of **Sphæralcea** (which *see*).

SPHÆROPHORA (of Blume). A synonym of **Morinda** (which *see*).

SPHÆROPHYSA (from *sphaira*, a sphere, and *physa*, a bladder; alluding to the shape of the pods). Including *Phyllolobium.* ORD. *Leguminosæ.* A genus comprising three species of hardy, glabrous or hoary, perennial herbs or sub-shrubs, natives of Russian Asia or the Orient. Flowers red, disposed in axillary racemes; calyx teeth sub-equal, or the two upper ones approximating; standard orbicular, laterally reflexed, naked within; wings falcate-oblong; keel incurved at apex, obtuse. Pods long-stipitate, inflated. Leaves imparipinnate; leaflets three or numerous, entire, ex-stipellate. The species, like some other salt-loving plants, are difficult to preserve in gardens. *S. salsula* should be grown in sandy loam, and salted water should be occasionally applied. Propagation may be effected by seeds, which sometimes ripen in this country.

S. caspica (Caspian). A synonym of *S. salsula.*

S. salsula (salt-loving). *fl.* dirty pale purple, marked with more obscure veins. July and August. *l.* with eight pairs of oval, obtuse, mucronate leaflets. Stems erect, and, as well as the leaves, clothed with adpressed pubescence. *h.* 1½ft. Russia, Siberia to North China, 1818. SYN. *S. caspica.*

SPHÆROPSIDEÆ. A very large section of Fungi, resembling the *Pyrenomycetes* in external appearance, with pycnidia quite like perithecia except in size, but inclosing no asci, the sporidia being produced singly on the tips of more or less evident stalks, inside the pycnidia (these almost always open by a hole or slit). The plants were formerly regarded as true species, but now they are considered, with good reason, to be only an imperfect stage of species of *Pyrenomycetes.* Many of them grow on living plants, which they destroy or weaken. The leading genera parasitic on living plants are: *Ascochyta*, with two-celled, transparent, pale sporidia; *Diplodia*, with two-celled, brown sporidia; *Hendersonia*,

Sphæropsideæ—*continued.*

with brown, oblong or lanceolate sporidia, made up of a row of three or more cells; *Phoma* and *Phyllosticta*,

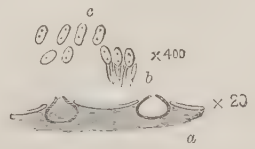


FIG. 511. PHOMA HERBARUM—*a*, Pycnidia in transverse section, × 20, one opened; *b*, Conidia still on the Stalks, × 400; *c*, Conidia free, after falling off the Stalks, × 400.

with transparent, elliptical, one-celled sporidia (see Fig. 511); *Septoria*, with long, slender, thread-like, pale sporidia; *Sphæropsis*, with elliptical, brown, one-celled sporidia; *Stagonospora*, like *Hendersonia*, but sporidia pale. The pycnidia are very similar in all the genera; but *Ascochyta*, *Phyllosticta*, and *Septoria* usually cause a discoloured spot on the leaves or stems of plants, in which the pycnidia are grouped. Such spots are seldom caused by the species of the other genera.

SPHÆROPTERIS (from *sphaira*, a globe, and *pteris*, a Fern; alluding to the globose involucres). ORD. *Filices*. A monotypic genus, the species being a stove Fern. For culture, *see* **Ferns**.

S. barbata (bearded). *fronds* 2ft. to 3ft. long, tripinnate; pinnules oblong, deeply pinnatifid. *sori* globose, on the back of a vein or veinlet; receptacle large; involucre inferior, globose, stipitate, at first inclosing the whole sorus, at length bursting vertically into two spreading lobes or lips. Nepaul, Sikkim, &c. SYN. *Peranema cyatheoides*.

SPHÆROSTEMA. Included under **Schizandra** (which *see*).

SPHÆROSTEPHANOS. Included under *Didymochlæna*.

SPHÆROSTIGMA. Included under **Œnothera** (which *see*).

SPHÆROTELE (of Link). Included under **Urceolina** (which *see*).

SPHÆROTHELE. Included under **Stenomesson** (which *see*).

SPHAGNUM (from *Sphagnos*, Moss). A genus of Mosses, found in all countries of the colder temperate zones. There are numerous species, but all delight in swamps, or in water; and they have, therefore, received the name of Bog-mosses. Seventeen species, and many varieties, have been recognised as British. So different is the genus *Sphagnum* from other Mosses in many respects, that it is placed in a distinct family, called *Sphagnaceæ*. It is easily recognised by the swampy habitats; by its erect stems, several inches long, and destitute of root-hairs; branches in clusters of from two to six, at frequent intervals along the stems, some spreading, others reflexed; male organs on lateral branches resembling small catkins; female organs in lateral branches like buds; capsules at first apparently sessile, then supported on short stalks, and conspicuous, globose, and bursting (often explosively) by a false lid, unlike the lids in true Mosses. The microscope shows peculiar structures also in the stems and leaves of *Sphagnum*, which deserve notice here, as they bear on the uses of the Mosses in gardening work. The middle of each stem consists of a mass of small cells, of a brown colour, inclosed in a layer of smaller and darker brown cells, with thicker walls. This structure is much like that of the stem of any common Moss. But the stems of the species of *Sphagnum* have an outer covering, composed of from one to four layers (according to the species) of much larger, transparent cells, with thin walls, which in most are pierced with holes, leading from cell to cell. The leaves are numerous, and are sessile, small, and more or less pointed. They have no

Sphagnum—*continued.*

midribs, and consist of a single layer of cells, among which there are two very different forms—the one long and narrow (inclosing protoplasm and chlorophyl bodies), forming a network, with large meshes, each filled by a transparent cell; the second form usually showing a thickening deposit in the shape of fibres, coiled in the interior round the walls, which are pierced by holes like those in the cells of the layers surrounding the stem. As in the latter, the transparent cells in the leaves, when mature, contain no protoplasm or chlorophyl. Their special duty is to suck in water from the swampy soil through the holes in their walls, and to pass it on from cell to cell upwards. They thus do the work of root-hairs, which are not present in these plants. This structure renders the Mosses of the genus *Sphagnum* almost as absorbent as a sponge, as may be easily proved by squeezing the water out of a clump of Moss, and again dipping the latter into water. The species all grow in compact tufts or mosses, often covering a considerable area. The plants tend to grow upwards, and to die in proportionate rate below. Some of the branches grow so large as to give the appearance of bifurcations of the stems; and, as these die away below, the stems and branches become separated, and form new plants. In this way, one form of multiplication of the individuals is secured. Reproduction is also effected by the spores, produced in the capsules. These are quadrangular in form. If they fall on damp soil, they produce flattened, branched, thin, green plates, on which Moss-plants grow from small buds. If the spores fall into water, they produce slender, branched, green threads, like those of other Mosses; and on these buds are formed, from which the Moss-plants grow.

The Bog-mosses are very important agents in the production of Peat Mosses and swamps, as they prevent the water from flowing away, and, by growing upwards and dying away beneath, add to the depth of the peat, though peat formed by them requires a long time to become firm suitable for fuel.

Uses. In gardens, *Sphagnum* is of much use, inasmuch as, when dry, it makes admirable packing material, being light, firm, and very elastic. The power of absorbing and retaining moisture renders the wet Sphagna excellent for packing round cuttings and young plants to be sent to a distance, as they supply water when it is needed. These Mosses are also much used in greenhouses for growing epiphytal Orchids or other plants of similar habits, which require plenty of moisture.

SPHENANDRA (from *sphen*, a wedge, and *aner*, *andros*, a male or anther; alluding to the shape of the anthers). ORD. *Scrophularineæ*. A monotypic genus. The species is a greenhouse, viscous-pubescent, annual or perennial herb. It thrives in loamy soil, and may be increased by seeds.

S. viscosa (clammy). *fl.* violet, pedicellate, loosely racemose; calyx five-parted; corolla broadly rotate, with five broad, entire, spreading lobes; stamens four. June. *l.* mostly opposite, oblong-lanceolate, with a few teeth; floral ones much smaller, ovate, entire, very acute or bract-like. *h.* 1ft. South Africa, 1773. (B. M. 217, under name of *Buchnera viscosa*.)

SPHENODESMA (from *sphen*, a wedge, and *desme*, a fascicle; alluding to the form of the inflorescence). SYNS. *Roscoea* (of Roxburgh), *Viticastrum*. ORD. *Verbenaceæ*. A genus consisting of about eight species of stove, climbing shrubs, natives of the Eastern provinces of India and the Malayan Archipelago. Flowers in rather small, pedunculate, sessile cymes; calyx five-toothed; corolla tube short, the limb spreading, of five ovate or oblong lobes; stamens five. Leaves opposite, entire. *S. pentandra*, the only species introduced, thrives in sandy loam. It may be increased by cuttings, inserted in sand, under a glass, in heat.

Sphenodesma—*continued.*

S. Jackiana (Jack's). A synonym of *S. pentandra.*

S. pentandra (five-anthered). *fl.* six in a head; corolla purple, the tube equalling the calyx, the throat white and very hairy; panicle ample, leafy below; peduncles filiform. June. *l.* shortly petiolate, oblong, obtuse at base, attenuated-acuminate, highly glabrous and shining above, pubescent beneath. *h.* 6ft. East India, 1823. SYN. *S. Jackiana.*

SPHENOGYNE. Included under **Ursinia** (which *see*).

SPHENOTOMA. Included under **Dracophyllum** (which *see*).

SPHEROIDAL. Approaching a sphere in shape.

SPHINGIDÆ (Hawk Moths). A family of Moths of very distinct and striking aspect, characterised by the thick, heavy body, and long, pointed wings, which are moved by powerful muscles. This allows of very rapid flight, except in a few (*Smerinthus*), in which the wings are broader, but weaker, and flight is slow and heavy. The moths are large, certain species, *e.g.*, Death's Head Moths, being among the largest of British insects. The antennæ are usually thicker in the middle, and end in a hooked bristle. The larvæ are generally peculiar in form, being rather thick, tapering from a little in front of the middle towards the head, but cut off abruptly behind, where a curved "horn" is present just above the blunt hinder end. Most of the larvæ are ornamented with seven oblique coloured lines on the sides. Those of several species have a habit of drawing back the head into the segments just behind it, and assume an attitude fancifully supposed to resemble the Egyptian Sphinx; and from this habit the family name has been derived. The popular name of "Hawk Moths" refers to their swiftness of flight. They mostly fly in the dusk of evening and of early morning; but one, the Humming Bird Moth, flies by day. Several of the species feed, as larvæ, upon garden produce, or on bushes and trees. *Acherontia Atropos* (formerly called *Sphinx Atropos*), the Death's Head Hawk Moth (see Fig. 512), feeds almost entirely on Potatoes (see remarks on INSECTS, under **Potato**), less often on Jasmine and the Tea-tree; but the larva, though very large, is not often seen, because of its habit of feeding only in darkness, concealing itself in the soil by day.

FIG. 512. DEATH'S HEAD HAWK MOTH (*Acherontia Atropos*).

The Hawk Moths that feed on cultivated trees and shrubs are the following: The Eyed Hawk Moth (*Smerinthus ocellatus*), on Apple and other fruit-trees, as well as on Willows, Poplars, &c. The moth reaches about 3in. in spread of wings, and is easily known by the

Sphingidæ—*continued.*

rosy-brown wings, clouded with olive-brown markings, and especially by a large, bluish, eye-like spot on each hind wing near the hind angle. The larva is green, with a blue horn; the seven oblique stripes on each side are white, edged with dark green above. The Poplar Hawk Moth (*S. Populi*) lives on Poplars and Willows, and on Laurel and Laurustinus. The moth reaches about 3in. across the wings, which are grey, with darker bands and a white dot in the middle of each fore wing, and a red patch at the base of each hind wing. The larva is green, sprinkled with yellow; the horn is yellow above, redder beneath; and the oblique stripes on the sides are yellow. This insect is the most plentiful of the family. The Lime Hawk Moth (*S. Tiliæ*) is less common. The moth reaches from 2½in. to 3in. across the wings. The fore wings have the outer edge a good deal indented; they are pale reddish or olive-brown, with a broad, greenish outer border, and a dark olive-green band across the middle, often broken so as to form two spots. The hind wings are blackish at the base, brown elsewhere, with a darker band across each. The larva feeds on Limes and Elm-trees. It is green, sprinkled with yellow dots, and the oblique stripes are yellowish, sometimes edged with red; the horn is blue above, yellow beneath, and behind it is a flat, purple scale edged with orange. The Privet Hawk Moth (*Sphinx Ligustri*) feeds on Privet and Lilac, and is common in the southern counties of England. The fore wings often exceed 4in. in spread, and are more pointed and narrower than in those insects already mentioned; they are pale brown, clouded with darker brown, and streaked with black; the hind wings are rosy-red, with three black cross-bars. The larva is bright green; the horn is black above and at the tip, and yellow beneath; the oblique streaks on the sides are white behind, delicate purple in front; the skin is smooth. The large Elephant Hawk Moth (*Chærocampa elpenor*) feeds on Willowherb, Fuchsia, and Vine. The moth reaches 2½in. in spread of the fore wings, which are pointed, and are olive-green, with pink outer and front margins, and two pink, oblique cross-bars; the base of each hind wing is black, and the rest of it pink. The larva is green, dark grey, or brown, with black mottlings. On each side of the fifth and sixth rings of the body is a large black patch, inclosing a white, kidney-shaped spot, the whole resembling an eye. The horn is short and black, with the tip white; the front rings of the body are narrowed and retractile, and when they are retracted the form of the larva has been fancifully compared to an elephant's head, the spots mentioned above resembling the eyes. This moth is common in many places.

Remedies. The only remedy necessary is hand-picking the larvæ, if they become so numerous as to require it. Their large size renders them easily seen, though their colours usually assimilate well with those of their food-plants. The larvæ of *A. Atropos* require to be looked for with a lantern at night, as they hide in the soil by day. The larvæ of almost all the Hawk Moths go underground to become pupæ, and little can be done to diminish the number of pupæ, or of perfect insects. The pupæ of *A. Atropos* are occasionally found when Potatoes are being harvested in gardens and in fields.

SPHINX ATROPOS. *See* **Sphingidæ.**

SPICATE. Resembling a spike; disposed in spikes.

SPICE BUSH. *See* **Lindera Benzoin.**

SPICILLARIA. A synonym of **Petunga** (which *see*).

SPIDER FLOWER. A common name for *Cleome.*

SPIDER ORCHIS. *See* **Ophrys aranifera.**

SPIDERS. The true Spiders are very helpful to gardeners, inasmuch as they live upon insects, and destroy multitudes of the hurtful kinds. The larger Spiders, such as the "Garden Spider" (*Epeira diademata*), live on the smaller Moths and the larger Flies, and the smaller Spiders aid largely to destroy the swarms of Aphides. Spiders vary much in habits. Many of them (*e.g., Lycosa, Salticus*) spin no webs, but hunt their prey; while others spread webs, often of great complexity and beauty, in which to catch their food, while they lie concealed in a retreat close at hand, ready to rush upon every insect that touches the web. Gossamer is the work of many small, dark Spiders, belonging to the genera *Linyphia, Neriene,* and *Walckenæra.*

Red Spider is not a true Spider, but a Mite of microscopic size, which spins a thin web over the surfaces of leaves, and often materially injures plants by sucking out the sap from the leaves. *See* **Tetranychus telarius.**

SPIDERWORT. A common name for *Tradescantia* and other plants.

SPIELMANNIA. A synonym of **Oftia** (which *see*).

SPIGELIA (named in honour of Adrian Spiegel [Latinised *Spigelius*], 1578-1625, Professor of Anatomy and Surgery at Padua, and a botanical author). SYNS. *Canala, Cœlostylis.* ORD. *Loganiaceæ.* A genus comprising about thirty species of stove, greenhouse, or hardy, glabrous, scarcely pilose, or stellate-tomentose, annual or perennial herbs, rarely sub-shrubs, natives of tropical and North America. Flowers red, yellow, or purplish, elongated or small, in unilateral, many or few-flowered spikes; calyx five-parted, the segments narrow; corolla tubular or salver-shaped; lobes five, valvate, at length spreading; stamens five, affixed to the tube. Leaves opposite, often membranous, penniveined or rarely three or five-nerved, connected by stipules or by a transverse membrane. The three species introduced are pretty plants, but are not often seen in cultivation. The Indian Pink, Pink Root, or Worm Grass, of the shops, is the produce of *S. marilandica.* A compost of loam and peat is most suitable for these plants. *S. anthelmia* may be propagated by seeds, and the other two species by cuttings.

S. anthelmia (worm-killing). Pink Root of Demerara. *fl.* of a purplish-white; corolla slender, ½in. long; spikes one to four in the upper axils. July. *l.* scarcely petiolate; lower ones opposite; uppermost ones quaternately whorled, ovate-oblong, acuminate at both ends. *h.* 1½ft. Guatemala to Brazil, 1759. Stove annual. (B. M. 2359.)

S. marilandica (Maryland).* Indian Pink; Maryland Pink Root; Worm Grass. *fl.* red outside, yellow within; corolla 1½in. long, the lobes lanceolate; spikes simple or forked, short. July. *l.* sessile, ovate-lanceolate, acute. Stems simple and erect from a perennial root. *h.* 6in. to 18in. North America, 1694. A showy, hardy plant. (B. M. 80; B. M. Pl. 180; L. B. C. 930.)

S. splendens (splendid).* *fl.* bright scarlet, upwards of 1in. long; corolla cylindric, slightly inflated upwards; spikes several towards the apex of the stem, elegantly recurved. July. *l.* 4in. to 5in. long, contracted into a short petiole, obovate-oblong, acuminate, slightly hairy. *h.* 1½ft. Mexico and Guatemala, 1860. A beautiful, stove perennial. (B. H. 1862, 65; B. M. 5268; R. G. 481.)

SPIGNEL. *See* **Meum athamanticum.**

SPIKE. An inflorescence in which the flowers are sessile along a simple, undivided axis or rachis.

SPIKELET. A secondary spike; the term is especially applied to the small, terminal collection of florets in grasses.

SPIKENARD, or **NARD.** *See* **Nardostachys.**

SPIKENARD, PLOUGHMAN'S. *See* **Baccharis.**

SPILANTHES (from *spilos,* a spot, and *anthos,* a flower; in allusion to the original species having yellow florets and a brown disk). Sometimes spelt *Spilanthus.* Including *Acmella.* ORD. *Compositæ.* A genus of about a score species of annual or rarely perennial herbs, inhabiting warm regions. Flower-heads yellow or white, with a yellow disk, often long-stalked, heterogamous. Leaves opposite, often toothed. The species have no garden value. *S. oleracea* (Para Cress) is cultivated in the tropics as a salad plant, and is now and then met with in botanical collections.

S. crocata. *See* **Verbesina crocata.**

SPILANTHUS. *See* **Spilanthes.**

SPILOSOMA MENTHASTRI. This insect, generally known as the White Ermine Moth, is one of the commoner of the *Bombycidæ,* at least in the larval stage. The larvæ are found in autumn on almost every low plant, including all kinds of cultivated herbs, They reach a length of over 1in., are stout in form, and are covered thickly with hairs of a brown or nearly black colour, but show a paler line down the middle of the back. In late autumn, they are commonly seen crawling on roads, on walls, and, in fact, everywhere, in the search for safe retreats in which to become pupæ. In summer, the moths emerge. The fore wings are rather rounded, and reach about 1⅝in. in expanse. They are creamy-white, with about thirty small black spots on each, forming four very irregular, curved rows; the hind wings are pure white, and bear three or four small black spots; the head and thorax are white, the abdomen orange-yellow, with a row of black spots down the middle, and also down each side; the body is thick and clumsy.

Remedy. Hand-picking is the most effectual, as the larvæ are easily detected; but they seldom do serious harm; and they may even be regarded as occasionally useful, since they feed on troublesome weeds. The "White Ermine" has allies which feed almost wholly on weeds, viz., the "Buff Ermine" (*S. lubricipeda*), which is buff-colour, with small, dark spots, and a dark, oblique cross-bar; the "Water Ermine" (*S. Urticæ*), with the wings white, with two black dots; and the "Muslin Moth" (*Diaphora mendica*), of which the female has semi-transparent white wings, and the male is smoke-coloured; the wings show black spots in both sexes.

SPINACH (*Spinacia oleracea*). An annual, cultivated for its leaves, which are cooked and served as a vegetable. It may be raised in any quantity from seed, which should be sown successionally through the summer, where the plants are intended to remain. Spinach prefers a deep, rich soil, and a rather moist situation, through the summer; for the winter crop, a drier and rather warm position should be selected. The first sowing may be made at the latter end of February, or early in March, according to the weather and the state of the ground. To maintain a supply, a sowing should be made about every fortnight, or at longer intervals, if there is but little demand for the leaves, as in dry weather the plants soon run to seed. Sow in drills 1in. deep, and about 1ft. apart. In May, and the two following months, single drills between rows of Beans or Peas may be sown with good success, as here partial shade is provided, and no injury is caused to the other crops, if the ground is good, Spinach being such a quick-growing subject. When the ground is dry, watering is of great advantage, or it may be newly turned up with a fork, and the seeds steeped about four hours in water, then sown at once. In order to obtain good-sized leaves, the plants should be thinned to 4in. or 6in. apart, so soon as they are large enough. In picking, the largest leaves should be selected, particularly during winter and early spring, when but little new growth is made.

Spinach—*continued.*

Spinach intended for standing through the winter should be sown, according to the locality, from the middle of August till the middle of September, when it is tolerably certain not to run to seed before winter. In unfavourable districts, the former date will not be too soon, while the latter will suit some localities. As before noted, a favoured spot should be selected, and the drills should be rather wider apart than for the summer crops: about 15in. will be close enough. It is often advisable to make two sowings for winter, as, if the first proves too early, the second may be better depended upon to succeed.

Sôrts. These are not numerous; they are divided into two classes, which are distinguished by the seeds, one being smooth, the other prickly. The Round-seeded, known as Summer Spinach, is most extensively grown in summer; the Prickly, or Winter Spinach, is the hardier of the two, and is sown for withstanding the winter. Flanders Spinach and Lettuce-leaved Spinach are varieties of the Round-seeded class, which are not always distinguished and grown separately from the common sort.

Fungi. The only Fungus that has been recorded as seriously destructive to Spinach is *Peronospora effusa.* For an account of this parasite, *see* **Peronospora.** Plants attacked by it should be removed without delay, and, if possible, burned, to destroy the spores of the Fungus.

Insects. The insect pests are not numerous, and there are none that can be regarded as peculiarly attached to this plant. Its chief foes are larvæ of Moths, such as are described under the headings **Noctua, Plusia, Potherb Moths,** and **Surface Caterpillars,** where also information will be found as to the remedies to be employed against their ravages.

When the plants are allowed to run to seed, the inflorescence is often infested by *Aphis Rumicis,* and other kinds of Green Flies. *See* **Aphides.**

SPINACH, MOUNTAIN. A name applied to *Atriplex hortensis.*

SPINACH, NEW ZEALAND. *See* **Tetragonia expansa.**

SPINACH, WILD. A common name for *Chenopodium Bonus-Henricus.*

SPINACIA (from *spina,* a prickle; alluding to the prickly processes of the fruit). Spinach. ORD. *Chenopodiaceæ.* A small genus (four species) of hardy, annual, erect, glabrous herbs, natives of the Orient. Flowers diœcious, very rarely hermaphrodite, glomerate; male glomerules in terminal, interrupted spikes, females often axillary. Leaves alternate, petiolate, triangular-ovate or hastate, entire or sinuate-toothed. *S. oleracea,* a valuable herb, is the only species calling for description here. For culture, &c., *see* **Spinach.**

S. oleracea (culinary). *fl.,* males green, growing in long, terminal spikes; females axillary, sessile, clustered. June. Seeds in some varieties prickly, in others smooth. *l.* large, thick, succulent, somewhat triangular, deep green, on long petioles. Stem erect, large, round, hollow, about 2ft. high. 1568. The varieties *glabra* and *spinosa* represent the ROUND and PRICKLY SEEDED varieties.

SPINDLE-TREE. *See* **Euonymus.**

SPINE. A sharp-pointed, woody or indurated body; a hardened leaf-stalk, stipule, abortive branch, or any other process into the composition of which woody tissue enters.

SPINESCENT. Terminating in a sharp point or spine.

SPINOSE. Furnished with spines; of a spiny character.

SPINULIFEROUS, SPINULOSE. Furnished with diminutive spines.

SPIRÆA (the old Greek name used by Theophrastus, probably from *speiras,* to wind; alluding to the fitness of the plants for forming into garlands). Meadow-sweet. ORD. *Rosaceæ.* A genus comprising about fifty species of handsome (mostly deciduous and hardy) shrubs, subshrubs, or herbs, broadly dispersed over the temperate and sub-frigid regions of the Northern hemisphere, rarely found in the tropics. Flowers pink or white, axillary or terminal, variously clustered; calyx persistent, with an urceolate, campanulate, or concave tube, and a limb of four or five imbricated or valvate lobes; petals four or five, rounded, shortly clawed; stamens twenty to sixty, in one, two, or three series. Leaves alternate, simple or pinnate, or twice or thrice ternate; stipules free, or adnate in a sheath at the bases of the petioles, rarely obsolete. The shrubby species succeed in almost any soil in open situations. The perennials prefer moist places and loamy soil, particularly *S. palmata* and *S. Ulmaria,* which succeed well by the side of water. Shrubby Spiræas are propagated by cuttings of the young wood, inserted in sandy soil, and kept close and shaded until rooted; or by means of the root-offsets which are so freely produced by most of the species. The perennials may be increased by divisions.

A modification of Maximowicz' key to the genus is given below. Some of the sections are looked upon as distinct genera by that author.

Aruncus.

Flowers diœcious; calyx withering in fruit, hypogynous with the stamens. Carpels normally three, cartilaginous. Leaves repeatedly divided in a ternate manner.

Aruncus
astilboides

Eriogynia.

Flowers hermaphrodite; calyx persistent in fruit, perigynous with the stamens. Carpels two-valved, membranous, free; seeds resembling sawdust. Leaves twice ternately divided.

pectinata

Spiræa proper.

Flowers hermaphrodite, rarely polygamous; calyx persistent in fruit, perigynous with the stamens. Carpels one-valved, cartilaginous, free; seeds several, more or less appendiculate; albumen none or almost obsolete.

SECTION I. PETROPHYTUM.

Flowers racemose; pedicels of equal length, sometimes very short.

cæspitosa

SECTION II. CHAMÆDRYON.

Flowers not truly racemose; pedicels of the corymbs or clusters one-flowered, of unequal length.

Series 1. Leaves of the flowering and sterile branches somewhat dissimilar, commonly very short.

alpina
crenifolia
hypericifolia
prunifolia flore-pleno
Thunbergii

Series 2. Leaves of the flowering and sterile branches similar, usually elongated.

Blumei
cana
cantoniensis
chamædrifolia
chinensis
media
pubescens
trilobata

SECTION III. SPIRARIA.

Corymbs or panicles compound.

Series 1. Flowers corymbose.

bella
betulifolia
canescens
decumbens
gracilis
japonica
vaccinifolia

Series 2. Flower paniculate.

Douglasii
salicifolia
tomentosa

Sibiræa.

Flowers paniculate, diœcious.

lævigata

Spiræa—*continued.*

Holodiscus.

Flowers in ample, many-flowered, terminal panicles; stamens longer than the petals.

discolor

Filipendula.

Herbaceous perennials. Flowers in axillary or terminal cymes. Leaves interruptedly pinnate.

Filipendula
lobata
palmata
Ulmaria
vestita

Sorbaria.

Ovules pendulous; carpels coriaceous, cohering at the base, completely splitting into two halves; seeds several. Leaves large, membranous, pinnately divided.

grandiflora
Lindleyana
sorbifolia

Chamæbatiaria.

Leaves bipinnatisect, Milfoil-like.

Millefolium.

The most popular species and varieties are here described. Except where otherwise indicated, all are hardy, deciduous shrubs.

FIG. 513. UPPER PORTION OF PLANT OF SPIRÆA ARUNCUS.

S. acutifolia (acute-leaved). A synonym of *S. hypericifolia acuta.*

S. alba (white). A synonym of *S. salicifolia paniculata.*

S. alpina (alpine). *fl.* white; sepals ascending; corymbs terminal, stalked, and in many instances leafless, large in proportion to the leaves. June and July. *l.* oblong-lanceolate, sessile, serrulated, glabrous; midrib pinnately branched. *h.* 4ft. to 6ft. Siberia, 1806.

S. amurensis (Amur). A synonym of *Neillia amurensis.*

S. ariæfolia (White-beam-leaved). A synonym of *S. discolor ariæfolia.*

S. Aruncus (Aruncus). Goat's Beard. *fl.* whitish, in many slender spikes, disposed in a long, compound panicle. June. *l.* thrice-pinnate; leaflets thin, lanceolate-oblong, or the terminal ones ovate-lanceolate, taper-pointed, sharply cut and serrated. *h.* 4ft. Northern hemisphere, 1633. Herbaceous perennial. See Fig. 513.

S. A. americana (American). A form with the interrupted male flowers scarcely larger than the female ones. Follicles more than twice as long as broad. North America, Japan, and China. In the Japanese Alps, this sometimes occurs only 1ft. in height.

S. A. triternata (triternate). *fr.*, carpels twice (often more than three times) as long as broad. *l.* frequently clothed with ashy pubescence beneath. Himalaya.

S. astilboides (Astilbe-like). *fl.* white, in spicate panicles. Summer. Japan. In general aspect, this species resembles *S. Aruncus*, but it is considerably dwarfer in stature, and much more graceful in character. A handsome perennial. See Fig. 514, for which we are indebted to Mr. Wm. Bull.

S. barbata (bearded). A synonym of *Astilbe japonica.*

S. bella (pretty). *fl.* of a beautiful red colour; calyx lobes deflexed; cymes terminal, spreading, and, as well as the branches, pubescent. July and August. *l.* ovate, glabrous, serrated, petiolate, glaucous beneath. Stems glabrous, rufous. *h.* 2ft. to 3ft. Himalaya, 1820. (B. M. 2426.)

S. betulifolia (Birch-leaved). *fl.* creamy-white; corymbs large, flat, several times compound. June. *l.* simple, oval or ovate, cut-toothed towards the apex; stipules obsolete. *h.* 1ft. to 2ft. North-eastern Asia and North America, 1819. Shrub nearly smooth. SYN. *S. corymbosa* (L. B. C. 671).

S. Blumei (Blume's). *fl.* white; cymes pedunculate, terminal, and, as well as the calyx, glabrous. *l.* obovate, obtuse, deeply toothed at the apex, rather smooth. *h.* 3ft. to 6ft. Japan. (B. H. 1858, 37, f. 2.)

S. Boursierii (Boursier de la Rivière's). A synonym of *S. discolor dumosa.*

S. cæspitosa (tufted). *fl.* white, densely spicate-racemose. Summer. *l.* small, silky, entire; radical ones rosulate, spathulate; cauline ones linear, minute. *h.* 6in. Northern Mexico, Nevada, &c.

S. callosa (callous-leaved). A synonym of *S. japonica.*

S. c. alba (white). A synonym of *S. japonica alba.*

S. c. rosea (rosy). A synonym of *S. japonica splendens.*

S. c. superba (superb). A synonym of *S. japonica superba.*

S. cana (hoary-leaved). *fl.* white; sepals spreading; styles thick; corymbs somewhat racemose, the lateral ones pedunculate, loosely few-flowered. June and July. *l.* ovate, ½in. to 1½in. long, acute, quite entire or slightly toothed, hoary-villous. *h.* 1ft. to 2ft. Croatia, 1825.

S. canescens (hoary). *fl.* pale pink or white; corymbs crowded, and, as well as the branches, tomentose. Summer. *l.* oval or obovate, obtuse, stalked, quite entire, villous. Himalaya, 1879. An erect, branched, canescent shrub, with the habit of *S. hypericifolia.*

S. cantoniensis (Canton).* *fl.* white and showy, disposed in terminal umbels. Early summer. *l.* small, simple, lanceolate, three-lobed, deeply toothed. *h.* 3ft. to 4ft. Japan, 1843. A glabrous, hardy, evergreen shrub. SYN. *S. Reevesiana* (B. R. xxx. 10). There is a double-flowered variety of this species in cultivation, which is highly desirable. (F. d. S. 1097.)

S. ceanothifolia (Ceanothus-leaved). A synonym of *S. chamædrifolia.*

S. chamædrifolia (Germander-leaved). *fl.* white, disposed in hemispherical corymbs; sepals reflexed; pedicels slender, elongated. June and July. *l.* ovate, deeply serrated at the apex, pubescent. *h.* 1ft. to 2ft. South-eastern Europe to Japan, &c., 1789. SYN. *S. ceanothifolia.*

S. c. flexuosa (flexuous). *fl.* generally smaller than those of the type. *l.* elliptic-lanceolate, unequally serrated, hardly incised. Eastern Siberia, &c. SYN. *S. flexuosa.*

S. c. ulmifolia (Elm-leaved). *fl.* white, disposed in nearly

FIG. 514.½[SPIRÆA ASTILBOIDES, showing Habit and detached Inflorescence.

Spiræa—*continued.*

hemispherical, terminal corymbs; sepals reflexed. June and July. *l.* ovate-lanceolate, acute, flat, sharply serrated, glabrous. *h.* 3ft. to 5ft. Siberia, &c., 1790. A handsome shrub. (B. R. 1222 and L. B. C. 1042, under name of *S. chamædrifolia.*)

S. chinensis (Chinese). *fl.* pure white, small, slightly fragrant, arranged in small, hemispherical corymbs. March. *l.* ovate-oblong, 1½in. long, acute, much wrinkled, deeply serrated, subtrilobed, beneath, as well as on the branches, pubescent. *h.* 2ft. Central China, 1843. SYN. *S. pubescens*, of Lindley (B. R. xxxiii. 38).

S. confusa (confused). A synonym of *S. media.*

S. corymbosa (corymbose). A synonym of *S. betulifolia.*

S. crenifolia (crenate-leaved). *fl.* white, in many-flowered, racemose corymbs, generally subtended by foliaceous bracts; stamens longer than the petals. Summer. *l.* stalked, round-oval, sharply toothed, rarely entire. North-east Asia.

S. decumbens (decumbent). *fl.* white, in terminal corymbs. Summer. *l.* roundish-oval, crenately-toothed. Tyrol. A dwarf, trailing shrub, suitable for covering rocks and banks. (G. C. n. s., xii., p. 752.)

FIG. 515. FLOWERING BRANCH OF SPIRÆA DISCOLOR DUMOSA.

Spiræa—*continued.*

S. discolor ariæfolia (discoloured, White-beam leaved). *fl.* dirty-white, in elegant, nodding panicles. Summer. *l.* rigid, cuneate at base, dark green above, silvery beneath; those on young growths about the size and shape of those of the Hawthorn. *h.* 4ft. to 10ft. North-west America. SYN. *S. ariæfolia* (B. R. 1365).

S. d. dumosa (brambly). This differs from the last-named plant in its less compound panicles and much smaller stature. See Fig. 515. SYNS. *S. Boursierii* (R. H. 1859, 519), *S. dumosa.*

S. Douglasii (Douglas').* *fl.* rose-coloured, nearly sessile, in a dense, terminal, thyrsoid panicle, 6in. to 9in. in length. August. *l.* simple, oblong-lanceolate, obtuse, serrulated towards the apex, covered with a white down beneath. *h.* 3ft. North-west America. (B. M. 5151; L. & P. F. G. ii. 178; R. H. 1846, 6.)

S. D. Nobleana (Noble's). *fl.* purplish-red; inflorescence looser than in the type. *l.* elliptic or oblong, obtuse or acute, more or less toothed, pubescent or almost glabrous beneath. California, 1859. (B. M. 5169 and I. H. 286, under name of *S. Nobleana.*)

S. dumosa (brambly). A synonym of *S. discolor dumosa.*

S. Filipendula (Filipendula).* Dropwort. *fl.* white, or rosy outside, ⅜in. in diameter; cymes loose, panicled; peduncles slender. June and July. *l.* interruptedly pinnate, glabrous, 4in to 10in. long, chiefly radical; leaflets many, sessile, deeply cut-serrate, ⅛in. to ½in. long, the terminal one three-lobed; stipules of cauline leaves toothed. Stem 2ft. to 3ft. high, erect, grooved, with a few small leaves. Europe (Britain), &c. Tuberous, herbaceous perennial. See Fig. 516. (Sy. En. B. 416.) There is a form of this with double flowers.

S. flagellata (whip-like). A synonym of *S. hypericifolia.*

S. flexuosa (flexuous). A synonym of *S. chamædrifolia flexuosa.*

S. Fortunei (Fortune's). A synonym of *S. japonica.*

S. gracilis (slender). *fl.* white, corymbose (with long, capillary pedicels); corymbs in lax, spreading, rounded, glabrous panicles. July and August. *l.* obtuse or orbicular, elliptic, glabrous, glaucous beneath, serrated at the apex. Branches hairy. *h.* 2ft. Nepaul, 1820. (L. B. C. 1403, under name of *S. vaccinifolia.*)

S. grandiflora (large-flowered). *fl.* white, corymbose. July and August. *l.* pinnate; leaflets serrately incised. *h.* 2ft. to 3ft. Siberia, &c. Sub-shrub. This much resembles *S. sorbifolia*, but the flowers are twice as large as those of that species, and the leaves are smaller. SYN. *S. Pallasii.*

S. grandiflora (large-flowered), of Hooker. A synonym of *Exochorda grandiflora.*

S. grandiflora (large-flowered), of Loddiges. A synonym of *S. salicifolia grandiflora.*

S. hydrangeæfolia (Hydrangea-leaved). A synonym of *S. japonica splendens.*

S. hypericifolia (Hypericum-leaved). *fl.* white, in either peduncled corymbs or sessile umbels; pedicels glabrous or slightly downy. June and July. *l.* obovate-oblong, three or four-nerved, entire or toothed, glabrous, slightly downy. *h.* 4ft. to 6ft. Asia Minor to Eastern Siberia, &c., 1640. SYN. *S. flagellata.*

S. h. acuta (acute-leaved). *fl.* in sessile corymbs. *l.* spathulate, elongated, acute, perfectly entire or rarely three to five-toothed, rather glabrous. SYN. *S. acutifolia.*

S. h. Besseriana (Besser's). *fl.* in rather loose, terminal corymbs. *l.* mostly entire. Plant rather glabrous. (L. B. C. 1252.)

S. h. crenata (crenate-leaved). A variety with obovate leaves.

S. h. thalictroides (Meadow-rue-leaved). *fl.* in a few-flowered, sessile corymb; stamens as long as the petals. June and July. *l.* smooth, glaucous, obovate, entire; those on the barren shoots cuneate-obovate or subdeltoid. Mongolia. SYN. *S. thalictroides.*

S. japonica (Japanese). *fl.* rosy-red, disposed in terminal, flat corymbs. June. *l.* glabrescent, simple, lanceolate, acute, sharply serrated; serratures thickened at the tips.

Spiræa—*continued.*

h. 4ft. to 6ft. China, Japan, &c., 1859. A very handsome and desirable, greenhouse, evergreen shrub. SYNS. *S. callosa* (L. & P. F. G. ii. 191), *S. Fortunei* (B. M. 5164 F. d. S. 871).

FIG. 516. INFLORESCENCE OF SPIRÆA FILIPENDULA.

S. j. alba (white). *fl.* white. A compact, pretty bush, not more than 1ft. high. SYN. *S. callosa alba.*

S. j. rubra (red). A very handsome variety, having dark red flowers (R. H. 1862, p. 100.)

S. j. splendens (splendid). *fl.* peach-coloured. A dwarf-growing, floriferous plant, adapted for forcing. Garden origin. SYNS. *S. callosa rosea, S. hydrangeæfolia, S. splendens.*

S. j. superba (superb). *fl.* deep rose-red. A fine garden form. SYN. *S. callosa superba.*

S. japonica (Japanese), of gardens. The plant commonly known by this name is **Astilbe japonica** (which *see*).

S. lævigata (smooth). *fl.* white, tinged with rose, dicœcious; male panicles larger and looser, in longer, interrupted racemes; female panicles smaller and more dense, in closely-packed, continuous racemes of smaller flowers. June. *l.* entire, oblong-lanceolate, glaucous, glabrous. *h.* 2ft. to 3ft. Siberia.

S. laxiflora (loose-flowered). A synonym of *S. vaccinifolia.*

S. Lindleyana (Lindley's).* *fl.* white, disposed in large, terminal panicles. September. *l.* large, unequally pinnate; leaflets eleven to twenty-one, sessile, ovate-lanceolate, coarsely serrated, glaucous beneath. *h.* 4ft. to 8ft. Himalayas. (B. R. 33.)

S. lobata (lobed). Queen of the Prairie. *fl.* deep peach-blossom colour, handsome; sepals and petals often in fours; panicle compound-clustered. June. *l.* interruptedly pinnate; terminal leaflet very large, seven to nine-parted, the lobes incised and toothed; stipules reniform. *h.* 2ft. to 8ft. North America, 1765. A glabrous, herbaceous perennial. The bruised foliage exhales the odour of Sweet Birch. (R. G. 397.) SYN. *S. venusta* (of gardens).

S. l. albicans (whitish). A chance seedling, raised near Metz, differing from the type in its lighter rose-coloured flowers. SYN. *S. venusta albicans.*

S. media (intermediate). *fl.* white, corymbose; stamens longer than the petals. June and July. *l.* elliptic-lanceolate, acute, more or less serrated, three or four-ribbed, hairy beneath, rarely entire or with a few large teeth towards the apex. Branches terete, sub-erect. *h.* 2ft. to 4ft. Northern Asia, &c. SYNS. *S. confusa, S. oblongifolia.*

S. m. rotundifolia (round-leaved). *fl.* pure white, scented, corymbose, abundantly produced. *l.* elliptic, three-toothed at apex. Japan, 1885. A handsome garden variety. (G. C. n. s., xxiii. 56.)

Spiræa—*continued.*

S. Millefolium (Milfoil-leaved). *fl.* whitish, in many-flowered racemes at the tips of the branches. Summer. *l.* glabrous above, stellate-tomentose beneath, much resembling in cutting those of the common Milfoil. California, &c., 1880. A low, evergreen shrub. SYN. *Chamæbatiaria Millefolium.*

S. Nobleana (Noble's). A variety of *S. Douglasii.*

S. oblongifolia (oblong-leaved). A synonym of *S. media.*

S. opulifolia (Guelder Rose-leaved). A synonym of *Neillia opulifolia.*

S. Pallasii (Pallas'). A synonym of *S. grandiflora.*

FIG. 517. SPIRÆA PALMATA.

S. palmata (palmate-leaved).* *fl.* of a brilliant crimson, disposed in large, corymbose panicles. June to August. *l.* palmately five to seven-lobed; lobes oblong, acuminated, acutely and doubly serrated. Stems (as well as the peduncles) crimson. *h.* 1ft. to 2ft. Japan, 1823. A beautiful, herbaceous perennial; it is one of the most striking and effective species in cultivation. See Fig. 517. (B. M. 5726.)

S. p. alba (white). This differs from the type in its white flowers and lighter green leaves.

S. p. elegans (elegant). A very fine garden plant, having large, paniculate corymbs of white flowers with red anthers, and pinnatisect leaves. 1878. (F. & P. 1878, 463.) Although figured under this name, and reputed to be a hybrid between *S. palmata* and *Astilbe japonica*, this probably has nothing to do with either of the plants named, and may, after all, only be a form of *S. Ulmaria.*

S. p. purpurascens (purplish). A form with purplish-tinted foliage.

S. paniculata alba (white-panicled). A synonym of *S. salicifolia paniculata.*

S. pectinata (comb-like). *fl.* whitish; raceme woolly, often compound, somewhat capitate, elongated in fruit. Summer. *l.* rigid, much attenuated and linear at the base, twice or thrice three-cleft; lobes linear, acute. Stems tufted, creeping; branches short, erect, leafy. *h.* 6in. to 12in. North America. Herbaceous perennial. (H. F. B. A. i. 28.)

S. prunifolia flore-pleno (Prunus-leaved, double-flowered).* *fl.* pure white, produced in fascicles along the whole length of the branches. Spring. *l.* small, glabrous, connate at base, and irregularly serrated in the upper half. *h.* 3ft. China and Japan, 1845. One of the most familiar garden plants in the genus. (S. Z. F. J. i. 70.)

S. pubescens (downy). *fl.* white; sepals erect; corymbs hemispherical. March. *l.* ovate-oblong, incised-serrated, pubescent beneath. *h.* 2ft. Mongolia, 1843.

S. pubescens (downy), of Lindley. A synonym of *S. chinensis.*

S. Reevesiana (Reeves'). A synonym of *S. cantoniensis.*

S. reticulata (netted). A synonym of *Astilbe japonica variegata.*

S. rhamnifolia (Rhamnus-leaved). A synonym of *S. vaccinifolia.*

S. salicifolia (Willow-leaved). *fl.* rosy or pink, disposed in terminal, racemose, dense, sub-cylindric cymes. July and August. *l.* oblong-lanceolate, glabrous, from 2in. to 3in. long, equally or

Spiræa—*continued.*

unequally serrated. Stems 3ft. to 5ft. high, stoloniferous. Europe (naturalised in Britain).

S. s. alpestris (alpine). *l.* shorter than those of *S. s. carnea.* Branches very short. A small shrub.

S. s. carnea (flesh-coloured). *fl.* flesh-coloured; panicles consisting of more or less spicate racemes. *l.* lanceolate. Bark of the branches yellowish.

S. s. grandiflora (large-flowered). *fl.* pink, twice as large as those of the type. An ornamental, free-growing shrub. (L. B. C. 1988, under name of *S. grandiflora.*)

S. s. latifolia (broad-leaved). *fl.* white. *l.* ovate-oblong. Bark of the branches reddish.

S. s. paniculata (panicled). *fl.* white, in large, branching panicles. Bark of branches reddish. SYNS. *S. alba* (G. C. n. s., xii., p. 753; W. D. B. 33), *S. paniculata alba.*

S. sorbifolia (Sorbus-leaved). *fl.* white, disposed in a thyrse-like panicle. July and August. *l.* stipuled, pinnate; leaflets sessile, opposite, lanceolate, doubly and sharply serrated. *h.* 3ft. to 6ft. Siberia, 1759.

S. splendens (splendid). A synonym of *S. japonica splendens.*

S. thalictroides (Meadow-rue-leaved). A synonym of *S. hypericifolia thalictroides.*

S. Thunbergii (Thunberg's). *fl.* white, axillary, mostly ternate; ovary free, not inflated. Spring. *l.* exstipulate, linear or linear-lanceolate, attenuated and acute at both ends, mostly argutely serrulated, rarely entire, glabrous on both sides. *h.* 1ft. to 3ft. Japan. (S. Z. F. J. i. 69.)

S. tomentosa (tomentose). *fl.* rose-coloured or rarely white, in short racemes, crowded into a dense panicle. July. *l.* simple, ovate or oblong, serrated; under surface (as well as the stems) very woolly. *h.* 3ft. North America, 1736. (T. S. M. 485.)

S. trifoliata (three-leaved). A synonym of *Gillenia trifoliata.*

S. trilobata (trilobed-leaved). *fl.* pure white; sepals ascending; corymbs numerous, compact, umbel-like. May. *l.* roundish, lobed, crenated, glabrous, reticulately veined. Branches ascending horizontally. *h.* 1ft. to 2ft. Altaian Alps, 1801. A very handsome, low, erect shrub. (W. D. B. 68, under name of *S. triloba.*)

S. Ulmaria (Ulmaria).* Queen of the Meadows; common Meadow-sweet, &c. *fl.* white, ¼in. to ⅓in. in diameter; cymes corymbose, very compound, 2in. to 6in. in diameter, pubescent. June to August. *l.* interruptedly pinnate, white and downy beneath; radical ones 1ft. to 2ft. long; terminal leaflet 1in. to 3in. long, acutely lobed; lateral ones entire, alternate, very small; stipules leafy, half-ovate, toothed. Stems 2ft. to 4ft. high, erect, furrowed. Europe (Britain), &c. Herbaceous perennial. (Sy. En. B. 415.)

S. U. phyllantha (leaf-flowered). *fl.*, sepals distinct, stipitate, transformed into whorled, lanceolate, sharply-serrated leaves; petals and stamens wanting, or, if present, more or less deformed.

S. vaccinifolia (Whortleberry-leaved). *fl.* white, in large, loose, shaggy panicles. July and August. *l.* smooth, ovate, crenate, on long petioles, glaucous beneath. Branches weak, round, downy. *h.* 1ft. to 2ft. Himalaya, 1838. SYNS. *S. laxiflora* (L. & P. F. G. ii. 183), *S. rhamnifolia.*

S. venusta (charming). A garden synonym of *S. lobata.*

S. v. albicans (whitish). A synonym of *S. lobata albicans.*

S. vestita (clothed). *fl.* white, ½in. in diameter; calyx lobes obtuse; cymes oblong, much-branched, very many-flowered. June. *l.* pinnatisect, sometimes hoary with thick white tomentum beneath; lateral leaflets small or wanting; terminal one 2in. to 6in. in diameter, palmately three to five-lobed, the lobes acutely lobulate and toothed. *h.* 1ft. to 1½ft. Himalayas, 1838. Perennial. (B. R. 1841, 4, under name of *S. kamtschatica himalensis.*)

SPIRAL. Appearing as if wound round an axis.

SPIRANTHERA (from *speira*, a spiral, and *anthera*, an anther; alluding to the spiral anthers). SYN. *Terpnanthus.* ORD. *Rutaceæ.* A monotypic genus. The species is a very handsome, sweet-scented, highly glabrous, stove, evergreen shrub. It thrives in a compost of peat and sandy loam. Propagation may be effected by cuttings of half-ripened wood, inserted thinly in sand, under a glass, which must be occasionally removed in order to prevent them from damping off, which they are otherwise likely to do.

S. odoratissima (very sweet-scented). *fl.* white, showy, sweet-scented, corymbose, axillary and terminal; calyx five-toothed, cup-shaped; petals five, elongate-linear, pubescent, imbricated; disk thick, erect, columnar; stamens five, inserted at the base of the torus. July. *l.* alternate, petiolate, trifoliolate; leaflets gland-dotted, acuminate, entire, glaucous beneath. *h.* 6ft. Brazil, 1823.

SPIRANTHERA (of Hooker). A synonym of **Pronaya** (which *see*).

SPIRANTHES (from *speiros*, a spiral, and *anthos*, a flower; alluding to the spiral inflorescence). Lady's Tresses. SYNS. *Aristotelea* (of Loureiro), *Cyclopogon, Gyrostachys, Ibidium.* Including *Sarcoglottis, Sauroglossum,* and *Stenorhynchus.* ORD. *Orchideæ.* A large genus (about eighty species) of stove, greenhouse, or hardy, terrestrial orchids, broadly dispersed over temperate and tropical regions. Flowers small or rather large, in unilateral or dense, sessile spikes; dorsal sepals and petals erect, connivent or slightly coherent in an upper lip or hood, or the ends alone spreading; lateral sepals free and more spreading, all nearly equal; lip sessile or distinctly clawed, often embracing the terete column by its broad base, spreading at apex, undivided or three-lobed. Leaves variable. Stem leafy, or leafless when flowering. Root-fibres often fascicled on a short rhizome, sometimes thickened into a tuber. The cultivated species are here described. Except where otherwise indicated, stove treatment is necessary. The hardy species thrive in turfy loam, amongst which pieces of chalk or limestone should be mixed; the stove and greenhouse ones succeed in well-drained pots filled with a mixture of turfy loam and fibrous peat, and during the season of rest these latter should be kept rather dry. Propagation is effected by carefully dividing the rootstocks of old plants, just before growth commences.

S. æstivalis (summer). *fl.* and bracts as in *S. autumnalis*, but rather larger; spike slightly pubescent, slender, many-flowered. July and August. *l.* 2in. to 6in. long, narrowed below; lower ones on the flowering stem linear, resembling the radical leaves. Stem 6in. to 18in. high, glabrous. Western Europe (Britain). Hardy. (Sy. En. B. 1473.)

S. australis (Southern). *fl.* generally pink, with a white lip, sessile; lateral sepals obscurely dilated at base, but not saccate; the broad base of the lip quite sessile, or sometimes appearing raised on a very short claw, with a tubercle on each side; spike spiral, very dense or rather loose. June. *l.*, lower ones linear or narrow-lanceolate, 1½in. to 4in. long; upper ones reduced to scales. Stem 6in. to 12in. or more high. Australia, New Zealand, tropical and temperate Asia, extending to some parts of Europe. 1823. Greenhouse. SYN. *Neottia australis.*

S. autumnalis (autumnal). *fl.* white, fragrant, sheathed by the cucullate, cuspidate bracts; lip channelled at the base, the tip exserted, crenate; spike slender. August and September. *l.* 1in. long, in lateral rosettes, ovate, acute, appearing after the flowers. Stem 4in. to 8in. high; upper part and inflorescence pubescent. Europe (Britain), &c. Hardy. (Sy. En. B. 1472.)

S. bicolor (two-coloured). *fl.* greenish, with a white lip; sepals gibbous below the lip; lip complicated, keeled on the back, cucullate at the dilated base; spike loose, spiral, 2in. to 4in. long, densely glandular-pubescent. January. *l.*, lowest rosulate, oblong-lanceolate, acuminate, disappearing before flowering. Stem distantly sheathed with minute leaves. *h.* 1ft. Trinidad, 1823. (B. R. 794, under name of *Neottia bicolor.*)

S. bracteosa (bracteate). *fl.* white and yellow; lateral sepals connate at base; middle lobe of lip three-lobed; bracts linear-lanceolate, leafy, longer than the flowers; spike rarely straight. May. *l.* rosulate, oblong, acute. *h.* 1ft. Brazil, 1835. (B. R. 1934.)

S. cernua (drooping). *fl.* pure white, sweet-scented, pubescent or nearly smooth; lip oblong and very obtuse when outspread (when not so, conduplicate, or the margins much incurved), the callosities at the base prominent; spike cylindrical, rather dense, 2in. to 5in. long. September and October. *l.* linear-lanceolate, the lowest elongated, 4in. to 12in. long. Stem leafy below, 6in. to 20in. high. North America, 1796. Hardy. (B. M. 5277; B. R. 823.) SYN. *Neottia cernua* (B. M. 1568; S. B. F. G. 42).

S. cinnabarina (cinnabar-coloured).* *fl.* yellowish-flesh-coloured, urceolate, slightly tomentose; segments yellowish within, approximating, reflexed at apex; lip whole-coloured; bracts coloured, acute; spike conical, thyrsoid, spirally twisted. June. *l.* lanceolate, sheathing, acute. Stem cylindrical, pale reddish, 2ft. to 3ft. high. Mexico, 1846. SYN. *Stenorhynchus cinnabarinus* (B. R. 1847, 65).

S. colorans (coloured).* *fl.* scarlet, glabrous, ⅜in. long, approximate; lip oblong-linear, shortly acuminate; bracts oblong-lanceolate, acuminate, as long as the flowers; spike 2in. to 3in. long. April. *l.* elliptic or elliptic-oblong, acute, 4in. to 6in. long. *h.* 2ft. West Indies and Mexico to Venezuela, 1790. SYNS. *Neottia speciosa* (A. B. R. i. 3; B. M. 1374; H. E. F. 3, 4; L. B. C. 838), *Stenorhynchus speciosus.*

S. c. maculata (spotted). *l.* variegated with bright green spots on a darker ground. 1883.

S. c. Ortgiesii (Ortgies'). *fl.* rose-coloured. *l.* marked with large white blotches. 1873.

Spiranthes—*continued.*

S. elata (tall). *fl.* greenish, ¼in. long; lip linear, blunt, entire; spike elongated, spiral, pubescent, 3in. to 8in. long; scape glabrous, sheathed with clasping-tubular, acuminate scales. July. *l.* rosulate, elliptic or elliptic-oblong, acute, petiolate, 2in. to 6in. long. *h.* 1½ft. to 2ft. West Indies, 1790. SYNS. *Neottia elata* (B. M. 2026; L. B. C. 343), *N. minor* (A. B. R. 376).

S. e. Lindleyana (Lindley's). *fl.* greenish-white, sub-sessile, in pairs, turned to one side; lip dilated, and turned down at the apex with lateral, recurved margins. February. *l.* variegated. Caraccas. This resembles *S. bicolor* and *S. cernua*; from the former it may be distinguished by its much shorter leaves and scape, and from the latter by its broader leaves and blunt lip.

S. Esmeralda (Esmeralda). *fl.* greenish-white, finally yellowish; outer perigone oblique, with glandular hairs outside the sepals; upper sepal ligulate, acute, the lateral ones nearly equal; petals lanceolate, acute, unequal-sided; lip oblong, pandurate or ovate, acute, with two conical, retrorse calli at base; spike spiral, elongated, many-flowered, glandular-hairy; scape above 1½ft. high, with many sheaths. *l.* rosulate, cuneate-oblong, acute, dark green, blotched with white. Brazil, 1862. (Ref. B. 121.) SYN. *S. margaritifera.*

S. euphlebia (veined). *fl.* not numerous, but crowded, horizontal, shortly pedicellate; perianth white, with red and brown veins on the free portions of the sepals and petals, pubescent externally; sepals united in a tube ¼in. long; petals semi-lanceolate, erect; scape light greenish-brown. November. *l.* all radical, 5in. to 6in. long, 1¼in. to 2in. broad, linear or obovate-oblong. *h.* 1ft. to 1½ft. Brazil, 1882. (B. M. 6690.)

S. grandiflora (large-flowered). A synonym of *S. picta grandiflora.*

S. margaritifera (pearl-bearing). A synonym of *S. Esmeralda.*

S. orchioides (Orchis-like). *fl.* lurid, puberulous; sac produced beyond the adnate portion into a bluntly conical, free spur, one-half the length of the ovary; lip oblong, pointed; spike 3in. to 5in. long. November. *l.* late in appearing, long, broadly lanceolate, pointed. *h.* 2ft. to 3ft. West Indies and Mexico to Brazil, 1826. SYN. *Neottia orchioides* (B. M. 1036; B. R. 701).

S. picta (painted). *fl.* greenish-white or variegated, eight to ten lines long, distant; sepals and petals linear-oblong, the lateral sepals decurrent; lip included, oblong, channelled below the veiny summit, dilated at base; spike 4in. to 6in. long, hairy; scape glabrous below, sheathed with acuminate scales. February. *l.* coetaneous, lanceolate or elliptic-oblong, 4in. to 6in. long, tapering into the petioles. *h.* 1ft. to 2ft. West Indies, &c., 1843. (B. R. 823, under name of *S. cernua.*)

S. p. grandiflora (large-flowered). *fl.*, sepals, petals, and lip greenish within. *l.* almost unspotted. Brazil, Guiana. SYNS. *S. grandiflora* (B. R. 1043), *Neottia grandiflora* (B. M. 2730).

S. p. variegata (variegated). *fl.*, sepals, petals, and lip white within. *l.* variegated. SYNS. *Neottia acaulis* (S. E. B. 105), *N. picta* (B. M. 1562; L. B. C. 214).

S. Romanzoviana (Count Romanzov's). *fl.* white, much larger and broader than in *S. æstivalis*; lip tongue-shaped, contracted below the recurved tip, the tubercles at the base smooth and shining; spike 2in. to 3in. long, stout, glandular-pubescent. August and September. *l.*, radical ones on the flowering stem narrow obovate-lanceolate, 3in. to 6in. long. Stem from 6in. to 10in. high, leafy throughout. Europe (Britain), &c. Hardy. (G. C. n. s., xvi. p. 465; Sy. En. B. 1474, under name of *S. gemmipara.*)

S. Sauroglossum (lizard-tongued). *fl.*, sepals green, broader towards the apex; upper petal agglutinate, the lateral ones arcuate; lip white, parallel with the column, linear, channelled, sessile; bracts subulate; raceme 1ft. or more long, dense, cylindrical; scape nearly 2ft. long, sheathed with distant, leafy scales. April. *l.* radical, oblong-lanceolate, sub-erect, fleshy, not plicate, one-third the length of the scape. Brazil, 1832. SYN. *Sauroglossum elatum* (B. R. 1618). As the genus *Sauroglossum* is merged into *Spiranthes*, and the old specific name of plant here described was pre-occupied, it has been necessary to give a new specific name.

S. Smithii (Smith's). *fl.*, in one variety, yellow, the lip marked with a few green veins; in another, brownish, having a yellowish lip striped with green; peduncle many-flowered. Costa Rica, 1868. This plant is allied to *S. picta.*

S. Weirii (Weir's). *fl.* reddish; raceme elongated, furnished with white, cuspidate bracts. *l.* petiolate, oblong, acute, above dark purple, freely spotted with cream-colour, below purplish. New Grenada, 1870.

SPIRE LILY. A common name for *Galtonia candicans.*

SPIROCONUS. A synonym of **Trichodesma** (which *see*).

SPIRONEMA (from *speira*, spiral, and *nema*, a filament; alluding to the spirally-twisted bundles of vessels contained in the filaments). ORD. *Commelinaceæ.* A monotypic genus. The species is a robust, creeping or stoloniferous, stove, perennial herb, more curious than beautiful. It thrives in any light, rich soil, and may be increased by divisions.

Spironema—*continued.*

S. fragrans (fragrant). *fl.* white, small, fragrant, in dense, head-like cymes, sub-sessile or very shortly pedicellate, forming a tall, rigid, few-branched panicle; sepals and petals sub-equal, distinct; stamens six, all perfect. May. *l.* large, oblong-lanceolate, sessile, in slightly-imbricated sheaths. Stem leafy, short, thick. *h.* 2ft. Mexico, 1839. (B. R. 1840, 47.)

SPIROSTEMON. A synonym of **Parsonsia** (which *see*).

SPITHAMÆUS. A span long. *See* **Span.**

SPLEENWORT. *See* **Asplenium.**

SPLICE-GRAFTING. Another name for whip or tongue-grafting, the best method of grafting, and one by which plants are very extensively propagated. For details of application, *see* **Grafting.**

SPODO. This term, used in Greek compounds, signifies ash-grey.

SPONDIAS (an old Greek name, used by Theophrastus for the plum, which the fruit of this genus much resembles). Hog Plum; Otaheite Apple. Including *Poupartia.* ORD. *Anacardiaceæ.* A genus comprising about eight species of stove trees, scattered over the tropics. Flowers small, shortly pedicellate; calyx small, deciduous, four or five-cleft; petals four or five, spreading, sub-valvate. Drupes fleshy. Leaves often clustered near the apices of the branchlets, alternate, impari-pinnate; leaflets opposite, often long-acuminate. A selection of the introduced species is given below. They thrive in a compost of loam and sand. Large cuttings will root in sand or mould, in heat.

S. borbonica (Bourbon). *fl.* dark-purple, in axillary and terminal, compound racemes. *l.* with numerous entire, acuminated leaflets. *h.* 40ft. Bourbon and Mauritius, 1825.

S. dulcis (sweet). Sweet Otaheite Apple. *fl.* yellowish-green, in a divaricate panicle. June. *fr.* golden-yellow, with somewhat the flavour of pine-apple. *l.*, leaflets elliptic-oblong, acuminate, repandly crenulated, smooth, with parallel veins. *h.* 50ft. Society Islands, 1793.

S. lutea (yellow). Golden Apple; Jamaica Plum. *fl.* yellowish-white; racemes panicled, often exceeding the leaves. Summer. *fr.* yellow, ovoid, 2in. long, with an agreeable, acid, aromatic flavour. *l.*, leaflets three to eight-jugate, petiolulate, ovate-lanceolate or lanceolate, acuminate, sub-entire or serrulated. *h.* 30ft. West Indies, 1739.

S. purpurea (purple). *fl.* purplish; racemes lateral, simple, few-flowered, much shorter than the leaves. Summer. *fr.* yellow, or tinged with purple. *l.*, leaflets eight to ten-jugate, shortly petiolulate, elliptic-oblong, somewhat blunt, usually serrated. *h.* 30ft. West Indies, 1817.

SPONDYLOCOCCA. A synonym of *Callicarpa.*

SPONGELET and **SPONGIOLE** (diminutives of Sponge). Terms formerly much in use to denote the tips of young rootlets, under the mistaken supposition that they absorbed the plant's food from the soil like a sponge. The formation of new cells in roots goes on (in monocotyledonous plants almost entirely, and in Dicotyledons to effect increase in length) very near the tip, behind the protecting layer, known as the root-cap or *pileorhiza.* The newly-formed cells are very small; and are so closely packed with protoplasm, as to appear very different from the cells in the older part of the root. The latter cells are larger, and more translucent, containing less protoplasm in proportion to their size. The small size of the cells in the tips of the roots, and their abundant contents, rendered it difficult, with the microscopes formerly in use, to make out the structure of this part. It was supposed that they formed a body like a sponge in its power of sucking in fluid from the soil, and the name *Spongiole* was, therefore, given. It is now known that the root-hairs, and not the tips of the roots, absorb the fluid nourishment that plants take in from the soil. *See* **Sap.**

SPONGE-TREE. A name applied to *Acacia Farnesiana*.

SPOONFLOWER. *See* **Labisia.**

SPOONWORT. A popular name for *Cochlearia*.

SPORADIC. Widely dispersed or scattered.

SPORANGIUM and **SPORANGE** (from *spora*, seed, and *aggeion*, a vessel; the latter word is sounded as if spelt *angeion*). Terms used to denote the small vessels or cases in which the spores of Ferns are produced, on the backs of the fronds, in the familiar, little, dark masses called sori. The Sporangia may be exposed on the surface of the fronds from their origin (*e.g.*, in Polypodies), but are usually protected, more or less completely, under a membrane or indusium. Each Sporangium is supported on a rather slender stalk in most Ferns; but in a few they are attached without a stalk. In the Tribe *Marattieæ* they may be partly joined to one another, and among *Ophioglosseæ* they are sunk in the substance of the modified fertile frond. In most Ferns, they are formed of a single layer of cells, which are thin-walled, with the exception of a single row of thicker-walled cells, known as the annulus, which runs over the top of the Sporangium, or around it horizontally, or forms a cap on the top. Whatever its position, the annulus, by its resistance to pressure, causes the ripe Sporangium to split in a definite place. The spores in the other Orders of Vascular Cryptogams also are contained in Sporangia; and the same term is employed for corresponding structures among the Cellular Cryptogams; but for the peculiarities of their structure in these groups the reader must refer to works on Systematic Botany, as these peculiarities are of no special interest in gardening.

SPORE (from *spora*, seed). The name given to those bodies in Cryptogams that reproduce the species, and from which young plants grow. Some Spores resemble the seeds of Phanerogams, or flowering plants, in being produced sexually; but they differ in the Spore never inclosing an embryo or young plant, as the seed does. The Spore, in fact, corresponds to the embryo itself, rather than to the entire seed. But, in addition to these sexual Spores, most Cryptogams produce others asexually from single cells, by a process of budding, or of cell division. These asexual Spores may very closely resemble the sexual in appearance; but they are often very different, and frequently a plant bears two or three varied forms of asexual Spores, produced, it may be, under different conditions as regards food, temperature, and environments. They often receive special names, *e.g.*, Conidia, Sporidia, Stylospores, Zoospores, and so forth among Fungi; and Stylospores, Tetraspores, &c., among Algæ. For a fuller account of the forms assumed by Spores among Fungi, *see* **Mushrooms, Oidium, Peronospora, Pleospora** and **Puccinia;** and for a description of the life-cycle of the higher Cryptogams, and of the part played by Spores in the cycle, *see* **Mosses** and **Prothallus.**

SPORIDIUM. The same as, or a diminutive of, **Spore** (which *see*).

SPORIFEROUS. Spore-bearing.

SPOROBOLUS (from *sporos*, a seed, and *bolus*, a casting; the seeds are loose and easily scattered). SYNS. *Agrosticula, Cryptostachys, Triachyrum, Vilfa.* Including *Agrostis* (in part). ORD. *Gramineæ*. A rather large genus (about eighty species) of greenhouse or hardy, annual or perennial grasses, of variable habit, broadly dispersed over the temperate and warmer regions of the globe, being numerous in America, and few in Europe and Russian Asia. Spikelets small, one, or rarely two, flowered; glumes three, membranous; panicle spike-formed or sometimes elongated and very slender. Leaves flat or convolute-terete. A few of the species have been introduced, but none are of much value from a garden standpoint.

Sporobolus—*continued.*

SPORT. A bud-variation or seed-variation.

SPRAGUEA (named in honour of Isaac Sprague, an American botanical draughtsman). ORD. *Portulaceæ*. A monotypic genus. The species is a half-hardy, dwarf perennial herb, of novel character. It is well adapted for planting on the rockwork, or in the edges of flower borders; any ordinary soil will prove suitable. Propagated by cuttings; or by seeds, sown in a cold frame, in spring.

S. umbellata (umbelled). *fl.* densely imbricate-spicate; sepals two, whitish, persistent, large, scarious; petals four, rosy-lake, just protruding; anthers purple; umbel terminal, compound, many-rayed. July. *l.*, radical ones rosulate, spathulate, slightly fleshy; cauline ones smaller, alternate. California, 1858. (B. M. 5143.)

SPRAY. A floral head-dress, worn on the side of the head, either composed of various flowers or of one branch or shoot, when specially suited for the purpose. The water from a syringe, when broken into very fine particles, is often called Spray.

SPREAD EAGLE. A common name for *Oncidium carthaginense*.

SPREKELIA (so called after J. H. Sprekelsen, of Hamburg, who wrote on liliaceous plants, and died in 1764; from him Linnæus received *S. formosissima*). ORD. *Amaryllideæ*. A genus of two species of greenhouse or half-hardy, tunicated-bulbous plants, requiring culture similar to **Amaryllis** (which *see*).

S. Cybister (Cybister). Tumbler Sprekelia. *fl.* reflexed; perianth red below, somewhat greenish above, the segments broad below, pale-striped within, long-narrowed above; filaments very long, reddish towards the base; peduncles above 1in. long; scape strong, sub-terete, upwards of 2ft. high, sanguineous below, four-flowered. April. *l.* appearing after the flowers, 1½in. broad, reddish in the centre towards the base. Bolivia, 1840. A very remarkable plant. (B. M. 3872.)

S. formosissima (very beautiful).* Jacobea Lily. *fl.* crimson or white, large and showy, pedicellate, in a spathe-like bract; perianth very declinate, without any tube, the segments scarcely unequal; stamens affixed at the base of the segments; scape fistular. June. *l.* late in appearing, loriform-linear. *h.* 2ft. Mexico, 1658. (S. B. F. G. ser. ii. 144.) SYNS. *S. glauca* (B. R. 1841, 16), *Amaryllis formosissima* (B. M. 47).

S. glauca (glaucous). A synonym of *S. formosissima*.

SPRENGELIA (named in honour of Christian Conrad Sprengel, of Brandenburgh, 1750-1816, who published, in 1793, a celebrated work on the fertilisation of flowers). SYNS. *Poiretia* (of Cavanilles), *Ponceletia*. ORD. *Epacrideæ*. A small genus (three species) of elegant little, erect or prostrate, glabrous, greenhouse shrubs, confined to extra-tropical East and South Australia. Flowers solitary and terminal, many-bracted; calyx of five sepals; corolla as long as, or scarcely exceeding, the calyx; lobes five, spreading, imbricated; stamens short, hypogynous. "Leaves with a shortly sheathing, often membranous base, completely covering the branches, very concave and stem-clasping immediately above the base, acute or acuminate, with a spreading point, finely veined or almost veinless, the upper ones passing into floral leaves or bracts, the sheathing bases of the stem leaves deciduous with them, leaving the denuded stem without scars" (Bentham). Two of the species have been introduced. These are best raised from seeds when they can be obtained, and grown on in firmly pressed, well-drained pots of sandy peat. Cuttings should be treated like those of *Epacris*.

S. Andersoni (Anderson's). A synonym of *Andersonia sprengelioides*.

S. incarnata (fleshy).* *fl.* pink; sepals coloured; corolla equalling the calyx, the petals almost free, the very short claws valvate and slightly cohering. May. *l.* ¼in. to ½in. long, tapering to a spreading or recurved point; floral ones similar, but smaller. *h.* 2ft. 1793. (L. B. C. 262; B. M. 1719.)

Sprengelia—*continued.*

S. Ponceletia (Ponceletia).* *fl.* scarlet; sepals leaf-like, but more lanceolate; corolla about as long as the calyx, the very short tube not separating into petal claws, the lobes much longer. May. *l.* broad, concave, spreading or incurved, acuminate and pungent-pointed, two to four lines long. *h.* 1ft. 1825. SYN. *Ponceletia sprengelioides.*

SPRENGELIA (of Schultes). A synonym of **Melhania** (which *see*).

SPRING BEDDING. A style of bedding in which hardy plants play a conspicuous part, along with various bulbs. In late springs, it is not an unfrequent occurrence, when the same beds are to be occupied with the ordinary tender subjects for a summer display, that, just at the time for planting the latter, the spring flowers are about at their best; this must, therefore, be anticipated, if the same beds are to be used for both sets of plants, or Spring Bedding must be carried out in a separate part of the garden. Early-flowering species and varieties of *Crocus*, also Daffodils, Hyacinths, and Tulips, will be past flowering before the middle of May, the season when summer flower-beds are required; but their foliage will rarely have ripened by that time, and, consequently, if the bulbs are of material value for another season's display, it would not be advisable to disturb them. Hardy plants, for Spring Bedding, have to be prepared in a reserve garden or border, for transferring, some time during September and October, to the positions where they are intended to flower. Many that are well adapted for the purpose are only of annual duration, and these should be raised from seeds, sown in the reserve ground, not later than about the middle of July, the young plants being transplanted and grown on afterwards.

Amongst hardy annuals, used for Spring Bedding, *Silene pendula*, and its variety *compacta*, are indispensable. Other valuable plants for the purpose, mostly perennials, are the following; they are generally of very easy culture: *Alyssum saxatile; Antennaria tomentosa*, suitable for an edging; *Arabis albida; Aubrietia*, in variety; Daisy, several double forms; *Iberis*, perennial species; *Myosotis dissitiflora*, and other species of Forget-me-not; *Phlox*, dwarf forms or varieties of *P. subulata*, &c.; *Polyanthus* and hardy Primroses, in great variety; *Pyrethrum* (Golden Feather); hardy Sempervivums; early-flowering Violas and Wallflowers. In the last-named, the chief colours represented are blood-red and golden-yellow.

SPRING-BEETLES. A name given to the insects that produce the dreaded **Wireworms** (which *see*). The name is derived from the power possessed by these beetles (*Elateridæ*), when laid on their backs on a hard surface, of leaping a few inches into the air. This power is due to a peculiar mechanism on the back between the thorax and abdomen. It enables the insects to turn over, which they would not otherwise do, because of the shortness of their legs. This habit has also gained for them the popular names of Skipjacks and Snap Beetles.

SPRING BELL. A common name for **Sisyrinchium grandiflorum** (which *see*).

SPRING GRASS. A common name for **Anthoxanthum** (which *see*).

SPRINGIA. A synonym of **Ichnocarpus** (which *see*).

SPRING SNOWFLAKE. A common name for **Leucoium vernum** (which *see*).

SPRING USHER MOTH. *See* **Hybernia.**

SPRING-WEEVILS. A group of Weevils which possess powerful thighs, especially in the last pair of legs, and are thus able to leap several inches. *See* **Orchestes.**

SPRUCE FIR. A term applied to *Dacrydium cupressinum*, several species of *Picea*, &c.

SPRUCE-GALL APHIS (*Chermes Abietis*). The maker of curious galls on the young twigs of Spruce-trees, especially in crowded plantations. In such situations, Spruces are often loaded with the galls of this insect. They resemble young cones or miniature pine-apples, whence they are often called Spruce Pine-apple Galls. When situated at the tips of young branches, they are usually quite regular in form; but when the base of the twig is affected, the Gall, though generally larger than when near the tip, is often confined to one side of the twig, which becomes much swollen, while the other side remains stunted. When full-grown, the Galls vary from ⅜in. to 1½in. in length, by about two-thirds as much in breadth, and consist of the swollen, overlapping bases of the leaves of the twig, which assume the appearance of scales, frequently prolonged into short, green tips. The galls are often red, but may be yellowish or pale green, according to exposure to, or absence of, light. While fresh, they are fleshy in texture; but, after a time, the scales gape apart, exposing numerous cavities between their bases, and become woody and brown. In this condition they frequently remain for months, or even for years, on the trees, the branches of which are often loaded with such dry galls, the growth of several previous years.

The gall-makers are Aphides, belonging to the genus *Chermes*, distinguished from most of the Aphides by the short, stout antennæ, the absence of honey-tubes, and the simple, unbranched veins in the fore wings. The species is *C. Abietis*, sometimes known also as *Adelges Abietis*. The insects vary a good deal, according to their stage of development and their sex. The originators of the galls are wingless, viviparous females, which are very small, ochreous-yellow (with green or purple shades and green legs), woolly, and oval. These females hybernate on the branches; and in spring each fixes herself near the base of a bud when it begins to grow, and, pushing in her beak, she thus at the same time obtains her own food, and, by the irritation she causes, gives rise to the swelling of the young leaves that form the gall. Between the swollen leaves are cavities, in one of which she is sheltered; and here she lays numerous eggs, which are covered with the woolly coating of her body. The larvæ soon emerge from the eggs. They spread over the gall, and, by the irritation their suction causes, increase the size of the gall, the scale-leaves overlapping and covering them, in the opinion of some observers; whilst others believe that the larvæ creep, through minute slits, into pre-existing cavities between the scales. In the cavities they become pupæ, and about June and July winged females are numerous. These are much larger than the wingless females, and are yellowish-green or golden-brown, with short, green legs, and horizontally-folded, broad wings. The males are very rare; they are very small, and wingless. The winged females soon scatter themselves over the trees, and lay eggs, from which, in due time, the wingless females are again developed.

Remedies. The best, where applicable, is to pick off and destroy the galls while young, before the insects have spread from them over the plants. Badly-infested trees or branches should be burned without delay. The galls should not merely be thrown on the ground, as they contain enough sap to permit of the insects coming to maturity in them after their removal from the trees. Overcrowding, deficiency of air and light, and bad drainage, greatly increase the risk to the trees of injury from these galls; hence, judicious thinning, draining damp soils, and, in fact, whatever tends to strengthen the trees, are all useful preventives of injury.

SPRUCE PINE-APPLE GALL. *See* **Spruce-Gall Aphis.**

SPRUE. A market name for the smallest sprouts of *Asparagus.*

SPUMESCENT, SPUMOSE. Froth-like in appearance.

SPUR. A hollow, terete extension of some part of a flower, usually nectariferous; *e.g.*, the calyx of Larkspur and the corolla of Violet. The term is rarely applied also to a solid, spur-like process.

SPURGE. *See* **Euphorbia.**

SPURGE FLAX. An old name for *Daphne Mezereum*, and other species.

SPURGE LAUREL. *See* **Daphne Laureola.**

SPURGE NETTLE. A common name for *Jatropha urens.*

SPURGE OLIVE. A popular name for *Cneorum tricoccum* and *Daphne Mezereum.*

SPURGEWORTS. Lindley's name for the *Euphorbiaceæ.*

SPURS, SLIPPER. *See* **Pedilanthus.**

SPYRIDIUM (from *spyris*, a basket, and *eidos*, resemblance; in allusion to the shape of the calyx). ORD. *Rhamneæ.* A genus comprising twenty-five species of greenhouse, Australian shrubs. Flowers sessile in heads or rarely solitary, surrounded by small, brown bracts; calyx five-lobed; petals five, hood-shaped, usually inclosing the anthers; stamens five; heads small, sessile, usually several together in a compound head or in corymbose cymes. Leaves usually small. Only one species has been introduced to gardens. It thrives in a compost of peat and sandy loam. Propagation may be effected by cuttings of the half-ripened shoots, cut to a joint, dried at the base, and inserted in sand, under a glass.

S. globulosum (globulose). *fl.-heads* nearly globular, numerous, in dense, corymbose cymes in the axils of the leaves, and not much exceeding them. *l.* ovate, obovate, or oblong, very obtuse, 1in. to 1½in., or rarely 2in., long, glabrous above, white or hoary beneath, or rarely slightly rusty. 1874. A tall shrub. (R. G. 795.)

SQUAMA. A scale, usually the homologue of a leaf.

SQUAMATAXUS. A synonym of *Saxegothea.*

SQUAMATE, SQUAMIFEROUS, SQUAMOSE. Scaly; covered with small, scale-like leaves.

SQUAMELLA, SQUAMULA. A diminutive or secondary scale.

SQUAMIFORM. Scale-like.

SQUAMULOSE. Beset or covered with minute scales.

SQUARROSE. When bodies are rough with spreading and projecting processes. Imbricated scales, bracts, or leaves are said to be Squarrose when their tips are pointed and very spreading or recurved.

SQUARRULOSE. Minutely squarrose.

SQUASH. A name applied to several species of *Cucurbita.*

SQUILL. *See* **Scilla.**

SQUILLA. Included under **Urginea** (which *see*).

SQUILL, ROMAN. A popular name for *Bellevalia.*

SQUILL, STRIPED. A common name for *Puschkinia scilloides.*

SQUINANT. An old name for *Andropogon Schœnanthus.*

SQUIRREL-TAIL GRASS. A popular name for several species of *Hordeum.*

SQUIRTING CUCUMBER. *See* **Ecballium Elaterium.**

STAAVIA (named after Martin Staaf, a correspondent of Linnæus). ORD. *Bruniaceæ.* A genus comprising about half-a-dozen species of greenhouse shrubs, resembling Heaths or Epacrises, and confined to the Cape of Good Hope. Flowers small, collected into terminal, disk-like heads, involucrated by numerous, mostly shining, whitish bracts, which are either longer or shorter than the leaves; petals free. Leaves small, erecto-patent or recurved, linear or acicular. The following is the best-known of the few species which have been grown in this country. It thrives in sandy peat, and may be propagated by cuttings of the young wood, inserted in sand, under a glass.

S. glutinosa (glutinous). *fl.* white, agglutinated with resinous juice; heads usually solitary, the size of a cherry; bracts of involucre whitish, greenish at base, ½in. long, with a black mucro. April. *l.* approximate, erect or spreading, from six to eight lines long, linear, trigonal, obtuse, callous, and, as well as the branches, quite smooth. *h.* 3ft. or more. 1793. (L. B. C. 852.)

STACHYOPOGON. A synonym of *Aletris.*

STACHYS (the ancient Greek name used by Dioscorides for this genus or for some similar plants, and derived from *stachys*, a spike; alluding to the spicate inflorescence). Hedge Nettle; Woundwort. SYNS. *Betonica, Eriostomum, Galeopsis* (of Mœnch), *Tetrahitum, Trixago, Zietenia.* ORD. *Labiatæ.* A large genus (nearly 200 species have been described, but probably not more than 160 are really distinct) of greenhouse or hardy, tall perennial or diffuse annual herbs, rarely sub-shrubs or small shrubs, broadly dispersed, but chiefly inhabiting North temperate and Oriental regions. Flowers purplish, scarlet, pale, yellow, or white, rather small or sometimes showy, sessile or very shortly pedicellate; calyx tubular-campanulate, five-toothed; corolla cylindric, with usually a ring of hairs inside, often incurved above, not, or scarcely, dilated at throat; upper lip of limb erect or spreading; lower one longer, spreading, three-lobed, the mid-lobe largest; stamens four; whorls two to many-flowered, axillary or clustered in terminal spikes. Nutlets ovoid or oblong. Leaves entire or toothed; floral ones conformed or reduced to bracts. *S. arvensis* (Field Betony), *S. Betonica, S. germanica, S. palustris* (Clown's All-heal), and *S. sylvatica*, are included in the British Flora. The species, some of which have a rather weedy appearance, will thrive in any ordinary garden soil; they may be increased by seeds, or by divisions. A selection of those best known in gardens is given below; except where otherwise indicated, they are hardy, herbaceous perennials.

S. albicaulis (white-stemmed). *fl.*, calyx loosely ten-nerved; corolla violet, glabrous, twice as long as the calyx; whorls six-flowered, remote; racemes elongated, slightly branched. Summer. *l.* remote, 1in. to 3in. long, the lower ones petiolate, the upper ones sessile, all lanceolate, deeply toothed, rounded-cuneate or narrowed at base. Stem branched, 2ft. to 3ft. high, white-woolly at base. Chilian Andes. (B. R. 1558.)

S. alpina (alpine). *fl.*, calyx teeth acute, spiny; corolla purplish or fuscous-red, woolly outside, scarcely twice as long as the calyx; whorls remote, many-flowered. Summer. *l.* petiolate, ovate, obtuse or slightly acute, crenate-serrate, cordate at base, villous, scarcely wrinkled. *h.* several feet. South Europe. A very variable plant.

S. a. intermedia (intermediate). *l.* more wrinkled, and sometimes slightly woolly beneath. A large form. (S. B. F. G. 100, under name of *S. sibirica.*)

S. angustifolia (narrow-leaved). *fl.* shortly pedicellate; corolla purplish, glabrous or slightly pubescent, the tube shortly exserted; whorls remote, two-flowered; racemes over 1ft. long, nearly simple. July. *l.* linear, entire, serrated, or the lower ones pinnatifid, all acute at apex. Branches twiggy, diffuse, several feet long. *h.* 9in. Tauria, 1823. Hardy sub-shrub. (S. B. F. G. 180.)

S. arenaria (sand-loving). *fl.*, calyx four lines long; corolla purplish, pilose outside, twice as long as the calyx; whorls loosely six to ten-flowered, remote; racemes loose, ascending, nearly 1ft. long. July. *l.* sub-sessile, oblong-linear or lanceolate, 1in. to 1½in. long, acute, slightly serrated, long-narrowed

Stachys—*continued.*

towards the base, entire. Levant, 1804. Plant decumbent. (B. M. 1959.)

S. aspera (rough). *fl.* sessile or nearly so; corolla purple or rose-red, glabrous throughout; spikes usually much interrupted. Summer. *l.* oblong-ovate to oblong-lanceolate, 1½in. to 4½in. long, acute or acuminate, rather obtusely serrated, nearly all distinctly petiolate, and truncate or merely sub-cordate at base. *h.* 2ft. to 4ft. North America and Japan. Plant sparsely hirsute or hispidulous-pubescent. (L. B. C. 1412.)

S. Betonica (Betony). Bishop's-wort; Wood Betony. *fl.*, calyx lobes spinescent; corolla red-purple, hairy, ¾in. long, the tube exserted; whorls in an oblong, long-pedunc1ed spike, 1in. to 3in. long. June to August. *l.* petiolate, oblong-cordate, obtuse, 1in. to 4in. long, deeply crenate; cauline ones few, much narrower than the radical ones. Stem 6in. to 2ft. long, ascending or erect. Europe (Britain). This plant was formerly much used in medicine. (Sy. En. B. 1067.) SYN. *Betonica officinalis.*

S. coccinea (scarlet).* *fl.* generally distinctly pedicellate; corolla scarlet-red, with a narrow, cylindrical tube twice or thrice as long as the calyx; spike interrupted. Summer. *l.* ovate-lanceolate with a cordate base, or oblong-deltoid, obtuse, crenate, 1in. to 2in. long; cauline ones slender-petiolate; floral ones sessile. *h.* 1ft. to 2ft. Texas to Arizona and Mexico, 1798. Greenhouse herbaceous perennial. (A. B. R. 310; B. M. 665; P. M. B. viii. 101.)

S. densiflora (dense-flowered) *fl.*, calyx teeth spiny; corolla flesh-coloured, twice as long as the calyx, villous outside, the tube incurved; spike dense, thick, 1½in. to 2in. long. June. *l.* petiolate, ovate-oblong, obtuse, 2in. to 3in. long, crenate, wrinkled, cordate at base; lower floral ones constantly ovate and scarcely sessile. Stem erect, 1½ft. high, nearly simple. South Europe, 1759. Plant hairy. (B. M. 2125, under name of *Betonica incana.*) SYN. *Betonica hirsuta.*

S. germanica (German).* *fl.*, calyx teeth longer than the tube; corolla pale pink, variegated with white, ½in. long; whorls four to six-flowered. April to November. *l.* coarsely crenate-serrate, often cordate; radical ones 2in. to 5in. long, rather long-petiolate; cauline ones shortly petiolate, ovate-oblong or lanceolate. Stem 1ft. to 3ft. high, very stout, branched. Europe (Britain). A shaggy biennial. (B. R. 1289; F. D. 684; J. F. A. 319; Sy. En. B. 1068.)

S. grandidentata (large-toothed). *fl.*, calyx teeth somewhat spiny; corolla violet, glabrous, twice as long as the calyx; whorls six-flowered, remote. Summer. *l.* petiolate, oblong-lanceolate, deeply toothed, all rounded-cuneate or narrowed at base; floral ones shorter than the calyx. Stem erect, 1ft. to 3ft. high. Chili. (B. R. 1080.)

S. grandiflora (large-flowered).* *fl.*, calyx six to seven lines long, purplish at apex, villous; corolla of a beautiful violet, twelve to fourteen lines long, glabrous; whorls many-flowered, distinct, the lower ones remote. May. *l.* petiolate, broadly ovate, obtuse, crenate, broadly cordate at base, wrinkled, villous; floral ones sessile. Stem 1ft. high. Siberia, 1800. (B. M. 700, under name of *Betonica grandiflora.*)

S. inflata (inflated). *fl.* sessile; calyx ½in. long, white-tomentose; corolla red, slightly silky outside, half as long again as the calyx; whorls distant, about six-flowered. July. *l.* sub-sessile, oblong, obtuse, entire, scarcely 1in. long, white-tomentose or woolly on both sides. Branches elongated, clothed with slightly floccose tomentum. *h.* 1½ft. Persia, 1852. Hardy sub-shrub. (B. R. 1697.)

S. lanata (woolly).* *fl.* striped; whorls many-flowered, the upper ones approximating in a spike. July. *l.* very thick and soft, oblong-elliptic, narrowed at both ends, scarcely crenulate, wrinkled. Stem 1ft. to 1½ft. high, clothed (as well as the leaves and calyces) with dense wool. Tauria, 1782.

S. Maweana (Mawe's).* *fl.*, calyx ½in. long, woolly; corolla pale straw-colour, with purple blotches on the lower lip, ½in. long and broad; whorls collected into a narrow-oblong, leafy spike. July. *l.* spreading, about 1in. long, ovate-cordate, sub-acute, deeply crenate-toothed, grey-green above; petioles of the cauline leaves longer than the blades. Branches 1ft. or more high. Morocco, 1878. Whole plant clothed with silvery-white hairs. (B. M. 6389.)

S. Salviæ (Salvia-like). A synonym of *Sphacele Lindleyi.*

S. sibirica (Siberian). A synonym of *S. albicaulis intermedia.*

STACHYS. This term, used in Greek compounds, denotes a spike: *e.g.*, *Phyllostachys*, *Stachytarpheta*, *Stachyurus.*

STACHYTARPHA. A synonym of **Stachytarpheta** (which *see*).

STACHYTARPHETA (from *stachys*, a spike, and *tarphys*, thick; alluding to the form of the inflorescence). Bastard Vervain. SYNS. *Abena*, *Cymburus*, *Stachytarpha.* ORD. *Verbenaceæ.* A genus consisting of about forty species of pilose, villous, or glabrous, stove herbs, sub-shrubs, or shrubs, natives of tropical and sub-tropical America, one being also broadly dispersed over tropical

Stachytarpheta—*continued.*

Asia and Africa. Flowers white, blue, purple, or scarlet, solitary in the axils of the bracts, sessile or half-immersed in the rachis of the spike; calyx five-toothed; corolla tube straight or incurved, the limb of five broad, spreading, obtuse or retuse lobes, equal or variously unequal; perfect stamens two; bracts sometimes small or narrow, appressed or loose, sometimes ovate or lanceolate, imbricated; spikes terminal. Leaves opposite or alternate, toothed, often wrinkled. All the species thrive in a soil composed of sandy loam and leaf mould. The shrubs may be propagated by cuttings, inserted in sand, under a hand glass, in bottom heat; the perennials may be multiplied by divisions, and the annuals by seeds. The best species, from a garden standpoint, are described below. *S. mutabilis* is a handsome, perpetual-flowering sub-shrub, the leaves of which have been imported from South America for the purpose of adulterating tea.

S. aristata (awned). *fl.* rich deep blackish-purple, in a very long, terminal spike, clothed with numerous leafy bracts, tapering suddenly into a long subulation; corolla tube curved. October. *l.* opposite, ovate or rhomboid-ovate, acute, coarsely serrated, entire at base, tapering towards the base into short footstalks, wrinkled. *h.* 2ft. South America, 1845. Sub-shrub. (B. M. 4211; F. d. S. 55.)

S. bicolor (two-coloured). *fl.* at first purple, gradually becoming pale greenish-blue, the throat of the long, funnel-shaped corolla remaining white; spike terminal, slender, exceeding the leaves; bracts subulate, erect. June. *l.* varying from ovate to ovate-lanceolate, acute, serrated from a little above the base. *h.* 3ft. Brazil, 1865. Shrub. (B. M. 5538.)

S. cayennensis (Cayenne). *fl.* blue, sunk in furrows of the rachis; bracts linear, acuminate, bristly above; spikes slender. May. *l.* ovate, blunt or bluntish, contracted into the petioles. *h.* 3ft. Cayenne, 1822. Shrub.

S. crassifolia (thick-leaved). *fl.* azure-blue; bracts hard, ovate; spikes long, slender, terete, straight, glabrous. June. *l.* 2in. to 3in. long, elliptic or oblong-obovate, entire at base, coarctate, sessile, obtuse, crenate-serrate, the margins revolute, pubescent-tomentose beneath. *h.* 2ft. Brazil, 1826. Shrub.

S. dichotoma (dichotomously-branched). *fl.* blue; bracts very narrow; spikes slender, 6in. to 18in. long. June. *l.* 2in. to 4in. long, ovate or ovate-oblong, coarctate at base, cuneate-decurrent, acute or acuminate, deeply crenate-serrate. Branchlets tetragonal. *h.* 2ft. South America. A dichotomously-branched sub-shrub. (B. M. 1848, under name of *S. urticifolia.*)

S. jamaicensis (Jamaica). Brazilian Tea-tree. *fl.* blue, sunk in deep excavations of the thickened rachis; bracts appressed; spikes about as thick as a goose-quill, 6in. to 10in. long. July. *l.* oval or oblong, coarsely serrated, tapering into the petioles. *h.* 2ft. West Indies, 1714. Annual, but suffrutescent at base. (B. M. 1860.)

S. mutabilis (changeable).* *fl.* crimson, at length rosy, large, sunk in furrows of the rachis; bracts lanceolate-subulate, spreading above the middle; spikes elongated, erect. All the year. *l.* ovate, contracted into the petioles, scabrous above, pubescent beneath. *h.* 3ft. South America, 1801. Sub-shrub. (A. B. R. 435; B. M. 976; R. G. 90.) SYN. *Verbena mutabilis.*

S. urticifolia (Nettle-leaved). A synonym of *S. dichotoma.*

STACHYURUS (from *stachys*, a spike, and *oura*, a tail; in allusion to the shape of the catkins). ORD. *Ternströmiaceæ.* A genus consisting of only two species of half-hardy, glabrous shrubs or small trees, one being Japanese, the other Himalayan. Flowers small, disposed in short, lateral or axillary racemes or spikes; sepals four, closely imbricated; petals four, free, imbricated; stamens eight, free. Leaves serrated, membranous. *S. præcox* is a shrub or small tree, producing its flowers in great profusion before the leaves are unfolded. It thrives in any common garden soil, but except in the south-western counties, requires the shelter of a wall. The plant may be readily propagated by means of cuttings of the half-ripened wood, inserted in sandy soil, under a bell glass, in a greenhouse, and kept shaded until roots are formed.

S. præcox (precocious).* *fl.* yellowish-green, ¼in. in diameter, sub-globosely campanulate, sessile or very shortly pedicellate; petals much larger than the sepals; spikes axillary, 2in. to 3in. long, curved, shortly pedunculate, many-flowered. March. *l.* 4in. to 6in. long, obovate or ovate-lanceolate, acuminate, serrulated, often oblique, thin, bright green. Branches slender, flexible. *h.* 10ft. Japan, 1864. See Fig. 518, p. 484. (B. M. 6631; R. H. 1869, 200; S. Z. F. J. 18.)

STACKHOUSIA (named after John Stackhouse, 1740-1819, a British botanist, who wrote on *Algæ*). The only genus of ORD. *Stackhousieæ* (which *see* for characters). The species best known to cultivation is described below. It thrives in ordinary soil, and may be increased by cuttings of the young shoots, inserted in sandy soil, in a cold frame.

S. linariæfolia (Toadflax-leaved). A synonym of *S. monogyna*.

S. monogyna (one-styled). *fl.* white; corolla tube three to four lines long; racemes at first dense, but often lengthening out to 4in. or 5in. April. *l.* linear or lanceolate, acute or obtuse, crowded, or few and distant, ¼in. to 1in., or, in very luxuriant specimens, 2in. long. Stems slender, simple or slightly branched, 1ft. to 1½ft. high. Hardy perennial. SYN. *S. linariæfolia*.

STACKHOUSIEÆ. A small natural order of herbs, usually forming a perennial stock, with erect, slightly branched, twiggy stems, often assuming a yellowish colour, rarely dwarf and tufted; they are almost endemic in Australia, one species extending to New Zealand, and another to the Philippine Islands. Flowers white or yellow, in terminal spikes, rarely solitary, three-bracted at base; calyx small, five-lobed or five-cleft; petals five, perigynous, with elongated claws, usually free at the base, but united upwards in a tubular corolla, with spreading lobes; stamens five, included in the corolla tube, of very unequal lengths. Leaves alternate, narrow, entire, often somewhat fleshy; stipules none, or when present very minute. The order *Stackhousieæ* is limited to a single genus—*Stackhousia*—comprising about twenty species.

STÆHELINA (named after Benedict Stæhelin, 1695-1750, a Swiss botanist). ORD. *Compositæ*. A genus consisting of half-a-dozen species of hardy or half-hardy sub-shrubs, natives of the Mediterranean region. Flower-heads purplish, narrow, solitary or densely corymbose; involucral bracts in many series, acute or obtuse; receptacle flat; achenes glabrous or silky-villous. Leaves alternate, entire or sinuate-toothed, white-tomentose beneath. Two species, *S. arborescens* and *S. dubia*, have been introduced, but they are probably not now cultivated.

STAFF-TREE. A common name for **Celastrus** (which *see*).

STAG BEETLES. *See* **Lucanus cervus.**

STAGES. In greenhouses and other glass structures, Stages are erected on which to stand plants that are grown in pots. They are generally constructed of wood, but are much more substantial when the uprights are made of iron, and the shelves of slate. If plants are found to get dry too frequently on slate Stages, it is an easy matter to spread a little fine ashes, spar, or shell, over the surface, beneath the pots, for retaining moisture.

Stages—*continued.*

Step-stages are those made so that one shelf is situated above the other, in a similar way to stairs; they are frequently preferred for the centre of a span-roofed greenhouse, or for the back part of a lean-to structure. The shelves in Step-stages are best made of battens, which may be fixed at any distance apart, according as the plants intended to be stood upon them are in medium-sized or small pots.

STAG'S-HORN FERN. A popular name for several species of *Platycerium*.

STAG'S-HORN SUMACH. A common name for **Rhus typhina** (which *see*).

STAKES AND STAKING. Stakes, in various sizes, are indispensable in gardens, both for supporting plants in pots, and also in the open ground. For the first-named purpose, those made from deal are the best; they may be purchased, ready for use, in a great variety of lengths and sizes, or cut out of ordinary laths of double thickness. Small annual growths of Hazel, which grow in great quantities from the base of established bushes, are valuable as Stakes for young plants that are being grown on; also prunings of fruit-trees, when appearances are immaterial. Strong Stakes, for fruit and ornamental trees, Raspberries, &c., are best selected from a plantation where the common Ash predominates, as this wood generally grows tolerably upright, and lasts a long time in use. Hazel, of moderate size, is also largely employed for Stakes, when required for packing, as, in a green or partially green state, it bends readily if required. Several other kinds of wood may also be selected, and made to answer their purpose, as Stakes.

The value of Staking, in connection with newly-planted trees, cannot be over-estimated, as, when properly executed, it prevents the trees from rocking about when the wind blows. When a single Stake is likely to be needed for permanently supporting a tree, it should be inserted at the time of planting; otherwise, it may very likely be driven in just where the best roots are situated, and thereby cause much injury. Plants that are likely to take care of themselves at the end of a year, are rendered safe for that period by placing three

FIG. 518. FLOWERING BRANCHLET OF STACHYURUS PRÆCOX (see page 483).

Stakes and Staking—*continued.*

Stakes, in the shape of a triangle, round them, just clear of the roots, and tying to each near the top. A small piece of carpet, or something soft, should be put round the stem where the ties are made, for protecting the bark.

All Stakes must of necessity be sharpened more or less to a point, at the lower or larger end, in order that they may enter the ground.

STALAGMITES. A synonym of **Xanthochymus** (which *see*).

STALK. A common term for any kind of lengthened support on which an organ is elevated.

STAMEN (from *stamen*, a thread; in allusion to the slender form). One of the male organs of flowers. In the Stamens the pollen is formed and ripened, before it is set free to fall on the stigma, and, through it, to gain access to and fertilise the ovules (*see* **Ovule** and **Pollen**). There are usually several Stamens in a flower, and the whole assemblage of them is often called the *andrœcium* (from the Greek words *aner*, *andros*, a male, and *oikos*, a house). A complete Stamen is made

FIG. 519. STAMEN, showing (*a*) Anther and (*f*) Filament.

up of two chief parts (see Fig. 519), the anther (*a*) and the filament (*f*) or stalk supporting the anther. In many plants, the filaments are long, and cause the anthers to project from the corolla or perianth (see Fig. 520). In other plants, they are shorter than the corolla; and in some there are no filaments (*e.g.*, in Orchids, in which the anther and the styles are adherent to one another). The filaments are usually free from one another, and are long and slender; but in many plants they are broad, or bear outgrowths (*Deutzia*), or are united into groups

FIG. 520. FLOWER OF LILIUM PYRENAICUM, showing long Stamens bearing Anthers projecting beyond the Perianth.

by their base (*Hypericum*), or grow together so as to form a more or less complete tube (*Eucharis*, *Hibiscus*). The anther is usually oval or linear; and in by far the greater number of plants it is evidently made up of two lobes, separated lengthwise by a portion called the "connective," which is similar in structure to the filament, and, in many anthers, is evidently a prolongation of it. The connective is very narrow and inconspicuous in some plants; broad in others, so that the lobes are widely separated. In some it is prolonged beyond the lobes at the tip, as a plate, or backwards

Stamen—*continued.*

in spurs or outgrowths of various forms. The uses of these variations in form and position, the structure of the walls of the two pollen-spaces in each lobe, and the course of development of the pollen, are described under **Nectary, Pollen,** and **Pollination.** Stamens vary in number from one (*Hippuris*) to an indefinite number (*Ranunculus*); but most frequently there are three, four, or five, arranged in one circle, or six, eight, or ten, in an outer and an inner circle. On the number and arrangement of the Stamens, Linnæus founded the great divisions in the classification named after him, and for years so widely used, and which is still frequently employed, as a most convenient key for rapidly determining the names of plants.

STAMINEAL. Consisting of, or relating to, stamens.

STAMINIFEROUS. Bearing stamens.

STAMINODE. A rudimentary stamen.

STAMINODY. A name for the metamorphosis of other organs into stamens.

STANDARD. The fifth or posterior petal of a papilionaceous corolla.

STANDARDS. A term applied to trees or plants that have an upright stem supporting the head. They are grown in the open, as, for example, Apple, Pear, Plum-trees, &c., in an orchard. Chrysanthemums, Heliotrope, and Mignonette, are examples of plants readily grown as Standards in pots.

STANGERIA (named after William Stanger, Surveyor-General of Natal, who died in 1854). ORD. *Cycadaceæ*. A monotypic genus. The species is a stove Cycad, requiring similar treatment to that recommended for **Zamia.**

S. paradoxa (paradoxical). Hottentot's Head. *l.* few, long-petiolate, pinnate, highly glabrous; pinnæ opposite and alternate, linear-lanceolate, obtuse, acute, or acuminate, spinuloso-serrulate or slightly crenate, rarely pinnatifid-lobed, traversed by parallel, forked veins, like those of a *Lomaria*; the lower ones petiolulate and sometimes bifid at base, the upper ones sessile. *cones* pedunculate, villous, densely clothed with imbricating scales in many series; males cylindrical; females shorter, oblong-cylindrical. Trunk or caudex 1ft. long, nearly subterraneous, sub-cylindrical, turnip-like, or deformed, narrowed at base. *h.* 2ft. South-eastern sub-tropical Africa, 1851. (B. M. 5121.)

S. p. Katzeri (Katzer's). *l.* few, ovate; pinnæ about eleven pairs, obverse-oblong, roundish and mucronate at apex, slightly undulated and crenately repand along the margins. This differs from the type in its smaller size. (R. G. 798, under name of *S. Katzeri*.)

S. p. schizodon (cut-toothed). *l.*, pinnæ irregularly inciso-serrate. 1872. This is the more robust form; it represents the one extreme, whilst *S. p. Katzeri* represents the other.

STANHOPEA (named in honour of Earl Stanhope, 1781-1855, President of the Medico-botanical Society). SYN. *Ceratochilus*. ORD. *Orchideæ*. A genus including about thirty species of beautiful, stove, epiphytal Orchids, natives of tropical America, from Brazil to Mexico. Flowers large, few, in a loose raceme, pedicellate; sepals and petals free, spreading, the latter sometimes undulated; lip thick and fleshy, variable and remarkable in structure; the hinder portion (hypochil) usually saccate, the middle part (mesochil) often two-horned, and the anterior portion (epichil) more or less movable; column erect or incurved; pollen masses two; bracts membranous, spathe-like; scape deflexed or pendulous. Leaf ample, plicate-veined, contracted into the petiole. Stem very short, many-sheathed, one-leaved, usually thickened below into a fleshy pseudo-bulb. Although the flowers of the Stanhopeas are ephemeral, lasting but a few days in perfection, yet their free-blossoming habit should secure their presence in all collections. Some of the flowers are very handsome, and many are very strongly perfumed.

Stanhopea—*continued.*

On account of the peculiar manner in which they are produced, the plants should be grown in baskets made even more open at the bottom and sides than is usual for other Orchids, as the racemes are pendulous, and often come out from beneath the basket. The latter should be suspended in a stove or house devoted to East Indian and Brazilian Orchids, and kept watered liberally during the period of growth. When at rest, the roots should be kept rather dry. The plants should be surrounded with fresh sphagnum, a few lumps of turfy peat, and some charcoal. The leaves should be sponged occasionally with clean water, as they are liable to be attacked by thrips and red spider. Propagation is effected by division of the old plants.

S. aurea (golden). A synonym of *S. Wardii aurea.*

S. Bucephalus (bull-horned).* *fl.* emitting a powerful fragrance; sepals, petals, and hypochil pale rich yellow, with purple dots and small blotches everywhere except on the hypochil; hypochil boat-shaped; mesochil two-horned; epichil roundish-ovate, cuspidate; raceme deflexed, consisting of several flowers. August. *l.* stalked, oblong, acuminate, plicate. *h.* 2ft. South Mexico to Peru, 1843. A remarkably handsome Orchid. (B. M. 5278; B. R. 1845, 24.)

S. B. guttata (spotted). *fl.*, sepals, petals, and hypochil of a deep apricot-colour; each petal, and the hypochil, marked with four brown blotches.

S. B. Roezlii (Roezl's). *fl.*, sepals, petals, and base of the lip deep saffron-yellow, spotted with brown; horns and column white, the latter also dotted with purple. Nicaragua, 1874. (R. G. 785.)

S. cirrhata (tendrilled). *fl.* absolutely solitary; sepals white, obtuse, much longer than the ovate, yellow petals; lateral horns of the yellow and violet lip produced from the hypochil, which is three-ribbed within, and rounded outside; mesochil wanting; epichil ovate, undivided; bracts spathe-like, imbricated, longer than the ovaries; column wingless, extended into a pair of feelers, as in some Odontoglots. *h.* 1ft. Nicaragua, 1840. (G. C. 1850, p. 295; L. & P. F. G. i. p. 31, 19.)

S. deltoidea (deltoid). *fl.* of a palish yellow, dotted over with crimson specks, large; lip orange-coloured, blackish-brown at the base, and marked on each side with a reddish-brown spot. Peru (?), 1862.

S. Devoniensis (Duke of Devonshire's). *fl.* pale creamy-yellow, thickly and irregularly spotted with deep crimson-purple, sweetly scented; dorsal sepal and petals barred near the base; lip whitish, purple-spotted; hypochil sub-globose, with a deep purple stain over the lower half; mesochil short, two-horned; epichil obtusely angled, rhomboid, obsoletely three-toothed at the end; peduncle bearing two flowers. July and August. *l.* shortly petiolate, lanceolate, plicate, pale green. Pseudo-bulbs ovate, ribbed. *h.* 1½ft. Guatemala, 1853. (F. d. S. 974; L. S. O. 1.)

S. eburnea (ivory-like). *fl.* white, fragrant; lip oblong, twice as long as the petals; hypochil and mesochil dull purple, or spotted with purple on the upper side, the latter solid, changing, truncate; epichil ovate; column very long; bracts shorter than the ovary; scape lax, pendulous. June. Venezuela, Guiana, and Brazil, 1828. (B. M. 3359; B. R. 1529.)

S. e. spectabilis (remarkable). *fl.* pale straw-coloured, powerfully scented; sepals broad; petals narrow; lip white, varnished, unmarked, except a pair of crimson lines, and a few small crimson dots at the base. Venezuela, 1868. (I. H. 531.)

S. ecornuta (hornless). *fl.* in pairs, about 4½in. across; hypochil somewhat slipper-shaped, extremely fleshy, bright orange, passing into pure white towards the point, handsomely purple-blotched on its sides, hornless, but having four little tumours; the rest of the flower pure white, except a few purple spots near the base of the firm, concave petals; bracts shorter than the ovary; scape short, pendulous. Central America, 1854. According to Dr. Lindley, this "may be regarded as a species with the hypochil (or lower half of the lip) alone present." (B. M. 4885; L. & P. F. G. i. 31; F. d. S. 181 and R. X. O. i. 43, under name of *Stanhopeastrum ecornutum.*)

S. florida (flowery). *fl.* white, large; sepals and petals marked on the inside with small, purple spots; lip covered with small, purple dots, and having a large blotch on each side between the two keels. Mexico (?), 1880. (G. C. xvi. pp. 561, 565; R. G. ii. 39.)

Stanhopea—*continued.*

S. gibbosa (gibbous). *fl.* dull yellow, blotched and barred with dull crimson, the colouring becoming darker on the sepals, about 6in. in diameter; hypochil incurved, keeled on each side; mesochil furnished with ligulate-falcate horns; epichil oblong, acute. June and July. Central America, 1870. A fine species, somewhat resembling *S. Wardii.*

S. grandiflora (large-flowered).* *fl.* pure white, except a few crimson dots on the middle and basal parts of the lip, fully 6in. in diameter when expanded, very fragrant; hypochil roundish, two-horned in front; mesochil solid, truncate, hornless, but obsoletely three-toothed; epichil ovate; column very long; scape short, pendent. *l.* broadly lanceolate, plicate. Pseudo-bulbs ovate, furrowed. Trinidad, 1824. SYN. *Ceratochilus grandiflorus* (B. iv. 176).

S. graveolens (strong-smelling). *fl.* having an extremely powerful and disagreeable odour; sepals and petals delicate straw-colour; lip at the base, and the central parts of the flower generally, of a rich, deep apricot-yellow, while the horns and upper end of the lip are like ivory turning yellow; column very broad, winged to near the base, so as to have almost the form of a parallelogram; bracts narrow, scarcely equalling the ovary; spike expanded. Guatemala (?), 1843.

S. g. aurita (eared). A variety with flowers wholly of a deep apricot-colour.

S. guttulata (slightly spotted). A synonym of *S. oculata.*

S. inodora (scentless). *fl.* pale straw-colour, with the short, saccate hypochil alone yellow, scentless; mesochil two-horned, two-toothed, deeply sulcate between the teeth; epichil somewhat rounded-ovate, entire, longer than the incurved horns; wings of the column gradually narrowing downwards until they entirely disappear; bracts broadly oblong, equalling the ovary; spike contracted. May. Mexico, 1844. (B. R. 1845, 65; R. X. O. 165.)

S. i. amœna (pleasing). *fl.*, hypochil deep yellow, with brownish-red eyes; epichil rose-coloured, dotted; horns dotted inside, much acuminate.

S. insignis (remarkable).* *fl.* of a pale dull yellow, richly spotted and stained with purple, large, showy, fragrant; hypochil globose, split in front; mesochil bearing falcate, incurved horns; epichil roundish-ovate, entire, shorter than the horns; column remarkable for its broadly-winged margin, which gives it almost the shape of a battledore; spike drooping, three or four-flowered. August and September. *l.* broadly lanceolate, dark green, plaited. Pseudo-bulbs clustered, ovate, furrowed. Brazil, 1826. A very handsome species, the type of the genus. (B. M. 2948-9; B. R. 1837; L. B. C. 1985; R. X. O. 164.)

S. i. flava (yellow). *fl.* wholly yellowish, very sweet-scented.

S. macrochila (large-lipped). *fl.* white or cream-coloured, marked with crimson spots disposed in lines. Mexico, 1859. (I. H. vi. p. 71.)

S. Martiana (Martius'). *fl.*, sepals pale straw-coloured, with a few small, vinous spots; petals white, larger-spotted, and with a broad blotch of crimson at base; lip white; hypochil short, sessile, scrotiform; mesochil short, with nearly straight, cirrhose horns; epichil oblong-linear, obscurely three-toothed; column pubescent, the margins scarcely dilated; peduncles two-flowered. Autumn. *l.* lanceolate, plicately veined. Pseudo-bulbs ovate, furrowed. Mexico, 1843. A magnificent and distinct species. (F. d. S. 2112-3; B. R. 1843, 44, under name of *S. M. bicolor.*) SYN. *S. velata.*

FIG. 521. STANHOPEA OCULATA, showing Habit and detached Flower.

Stanhopea—*continued.*

S. oculata (eyed).* *fl.* usually lemon-coloured, with a large number of lilac spots on the sepals, a smaller number on the petals, a deep yellow eye, and two, or occasionally four, large, dark brown spots on the side of the hypochil, which is very much lengthened out, as if unguiculate; horns semi-terete, ascending, acute; peduncle bearing a drooping raceme of about six flowers. July to November. *l.* large, broadly lanceolate, nerved. Pseudo-bulbs small. Mexico, 1829. A free-flowering and very showy species. See Fig. 521. (B. M. 5300; B. R. 1800.) SYNS. *S. guttulata, Ceratochilus oculatus* (L. B. C. 1764). Numerous varieties of this species occur in gardens, varying in colour and in the spotting of the lip. Most of them are sweet-scented.

S. o. Barkeriana (Barker's). *See* **S. o. Lindleyi.**

S. o. crocea (saffron-yellow). A synonym of *S. ornatissima.*

S. o. Lindleyi (Lindley's). *fl.* of a dull wine-red, but little spotted. *S. o. Barkeriana* is probably the same as this.

S. ornatissima (very ornate). *fl.* of a deep orange-colour, spotted with red, and marked towards the base with large blotches of reddish-brown; spikes drooping, six to seven-flowered. *l.* plaited. Peru (?), 1862. (I. H. 325; R. G. 189, under name of *S. oculata crocea.*)

S. platyceras (broad-horned). *fl.* nankeen-yellow, marked with purplish dots and circles of small points, large; hypochil marked on each side with one large, brownish-purple spot. New Grenada, 1868. This plant is closely related to *S. grandiflora.* (Ref. B. 108.)

S. pulla (blackish). *fl.* apricot-yellow, small; lateral sepals oblong, acute, reflexed, the upper one narrower; petals very bright yellow, shorter, narrower, ligulate, acute, very bright yellow; lip very bright, shining, like a plump shoe with a roundish knob at its top and with sharp, semi-oblong side borders; inside stands a nearly square body with four keels, converging like the letter V; between this and the apical knob is an inconspicuous, transverse slit; knob white; the side borders and V-like keels brownish-purple; peduncle short, strong, two-flowered. Pseudo-bulbs short, conical, ribbed, dark. Costa Rica, 1877. (R. X. O. 205.)

S. quadricornis (four-horned). *fl.* pale yellow, sparingly spotted with crimson; hypochil oblong, having two prominent horns standing erect on the lower edge of the cavity; mesochil two-horned, fleshy, excavated; epichil ovate, entire, shorter than the terete, incurved horns; bracts very short, narrow. Central America. (B. R. 1838, 5.)

S. radiosa (rayed). A synonym of *S. saccata.*

S. Reichenbachiana (Reichenbach's). *fl.* of a delicate shining white; sepals and petals becoming ochre-coloured; hypochil becoming rosy, semi-globose, prolonged on the upper border into an angle; mesochil solid, with a deep channel, abrupt in front; epichil triangular, rather convex. Columbia, 1879. A curious plant, resembling *S. eburnea,* but larger and more conspicuous.

S. Ruckeri (Rucker's). "A noble species, with the habit of *S. Wardii,* and its general colour, except that it is paler; but the epichil is beautifully stained with pink, and the eyes of the hypochil are very faint. It is distinctly separated by the peculiar form of the hypochil, which, instead of being oblong, is so much narrowed to the base as to be obovate; by the entire want of lateral teeth on its margin; and by the presence of a very strong, inflexed tooth, in which the wide, not closed-up fissure of the mesochil terminates" (Lindley). Nicaragua, 1843. (L. J. F. 375, under name of *S. R. speciosa.*)

S. saccata (saccate). *fl.* greenish-yellow, regularly speckled, but not blotched, with brown, deep yellow at base, small; sepals and petals turned completely back on the ovary; hypochil very deep and incurved; mesochil reduced to space sufficient for the development of two broad, flat horns; epichil oval, three-lobed; bracts shortened. Guatemala, 1836. SYN. *S. radiosa* (I. H. viii. 270).

S. Shuttleworthii (Shuttleworth's). *fl.* having the sepals, petals, and basal part of the lip apricot-colour, with dark purple blotches; front part of the lip whitish-yellow, with dark purplish spots on the anterior blade; column whitish, with a green middle part, spotted with purple on the inside. Columbia, 1876. This is allied to *S. insignis.*

S. tigrina (tiger-marked).* Lynx Flower. *fl.* deep orange-yellow, richly blotched with purplish-brown, powerfully scented, as much as 8in. in diameter; hypochil roundish, yellow, having radiating, toothed lamellæ within the cavity; mesochil two-horned; epichil oval, equally trifid, equalling the flat, falcate horns; column excessively broad; raceme three or four-flowered. July to September. *l.* large, broadly lanceolate, deep green, plicate. Mexico, 1836. This is, without doubt, the finest species of the genus. (B. M. 4197; B. R. 1839, 1; F. d. S. 713-5, under name of *S. t. superba.*)

S. t. lutescens (yellowish). *fl.* brilliant yellow, inclining to orange, barred with deep chocolate, very large and handsome. Guatemala. A grand variety for exhibition.

S. t. nigro-violacea (blackish-violet). *fl.* wholly of a deep brown-purple, except the edges of the sepals and petals and the upper half of the lip.

Stanhopea—*continued.*

S. tricornis (three-horned). *fl.* whitish-ochre, with darker tips, having crimson spots on the disk and base of the petals and on the base of the sepals; dorsal sepal reflexed over the ovary, the lateral ones spreading; petals entirely covering the lip; hypochil marked on the outside with white, longitudinal lines, rough within and purple dotted, half-globular; epichil orange-ochre, having a third horn at the base in addition to the two present at the side; horns ligulate, acute; peduncle pendent, two-flowered. Pseudo-bulbs small. Peru, 1879. (L. & P. F. G. i. p. 31; F. M. n. s. 469.)

S. velata (veiled). A synonym of *S. Martiana.*

S. venusta (charming). A form of *S. Wardii.*

S. Wardii (Ward's).* *fl.* showy, and deliciously scented; sepals and petals golden-yellow, much dotted with purple; lip pale yellow, with two large, dark velvety-purple spots on the deep yellow, oblong, depressed hypochil; mesochil having two fleshy horns dotted with purple; epichil roundish-ovate, acute, with two semi-terete, falcate, sub-cirrhose horns, also thickly spotted with purple; racemes drooping, several-flowered. *l.* broad, acuminate, plicate. Guatemala and Venezuela, 1835. (B. M. 5289; L. S. O. 20.) *S. venusta* is a whole-coloured variety of this species. *S. graveolens* (F. d. S., Aug., 1846) is a form of *S. Wardii,* having flowers of a dirty-white colour, merging into golden-yellow at the centre.

S. W. aurea (golden). *fl.* of a deep orange-yellow, large and fragrant; hypochil bearing two dark spots "which are in some manner lost in the flood of yellow that surrounds them" (Lindley). Summer and autumn. 1835. SYN. *S. aurea.*

S. Warscewicziana (Warscewicz's). *fl.*, sepals and petals dirty-white, the latter very acuminate; hypochil yellowish-white, globose, highly glabrous within; mesochil two-horned, deeply sulcate, with reflexed teeth; epichil finely dotted with red; horns very acute, incurved; column broadly winged, unguiculate; bracts much shorter than the ovary. Chiriqui Mountains. (R. X. O. ii. 125.)

S. xytriophora (pitcher-bearing). *fl.* of a pale straw-yellow, with purple markings on the base of the lip and purplish dots on the rhomboid epichil; hypochil remarkably short. Peru, 1868.

STANHOPEASTRUM ECORNUTUM. *See* **Stanhopea ecornuta.**

STANLEYA (named in compliment to Edward Stanley, Earl of Derby, who took an interest in many sciences, especially ornithology). ORD. *Cruciferæ.* A genus comprising three species of stout, hardy, glaucous, perennial herbs, confined to California. Flowers yellow, many in elongated, straight racemes; sepals short, spreading; petals narrow, elongated, long-clawed. Leaves undivided or pinnatifid. *S. pinnatifida*—the only species introduced to cultivation—is a pretty plant, thriving in vegetable mould, in the open border. It may be increased by seeds, or by divisions.

S. pinnatifida (pinnatifid-leaved). *fl.* yellow, very closely resembling those of a species of *Cleome.* May. *l.* interruptedly pinnatifid, thick, similar to those of a species of *Brassica.* *h.* 3ft. 1812.

STANNIA. A synonym of **Posoqueria** (which *see*).

STAPELIA (named by Linnæus after Boderus à Stapel, a physician of Amsterdam, and commentator on Theophrastus; he died in 1631). Carrion Flower. Including *Caruncularia, Gonostemon, Orbea, Tridentea,* and *Tromotriche.* ORD. *Asclepiadeæ.* A large genus (upwards of sixty species have been described) of low, thickly fleshy, leafless, greenhouse succulents, confined to South Africa. Flowers usually large and showy, but having a fœtid odour (like carrion), solitary, twin, or rarely fascicled, at the base or sides of the branches, on short, or rarely long, peduncles; calyx five-parted, with five glands within the base; corolla livid-purple or pale yellow, spotted and marbled, with a very short tube, and a much-spreading, five-lobed limb, the lobes broad or narrow, valvate; corona double, the outer horizontally spreading and deeply five-lobed, the inner consisting of five scales; stamens affixed at the base of the corolla. Stems deeply four-angled and toothed; young specimens sometimes having a caducous, rudimentary leaf at the apex of the teeth. A selection of the species most worthy of cultivation is given below. All require a thoroughly well-drained compost. This can be obtained by using a

Stapelia—*continued.*

good supply of pieces of brick rubbish amongst the sandy loam in which they are potted. During winter, they should have but little water. A shelf near the glass, in a light, sunny, airy place, is best adapted for them. Propagated by cuttings. Several plants formerly included under *Stapelia*, will now be found under **Duvalia, Huernia, Piaranthus,** and **Podanthes** (which *see*).

S. anguinea (snake-speckled). *fl.* glabrous; corolla yellow, marked with numerous rufous spots; orb large, marked with large spots of two forms, dark brown-yellow on the sides near the base; gynostegium dotted with dark brown; peduncles solitary in the axils of the branchlets. June and July. Branches erect, with sub-recurved teeth. *h.* 6in. 1812. (L. B. C. 828; B. M. 1169, under name of *S. picta.*)

S. Asterias (star-fish).* Starfish Flower. *fl.* large; corolla of an obscure violet-colour, the segments variegated with transverse, yellowish stripes, the bottom dark purple; segments lanceolate, oblique, with revolute margins, ciliated, wrinkled; peduncles often solitary. May to November. Branches many, erect, toothed; teeth short and erect, or slightly incurved with an acumen. *h.* 6in. 1795. One of the handsomest species. (B. M. 536; L. B. C. 453.)

S. barbata (bearded). A synonym of *Huernia barbata.*

S. Bayfieldii (Bayfield's). *fl.*, corolla 2½in. to 2⅝in. in diameter, with the lobes expanded; back puberulous, green, tinged with purple, the nerves darker; face glabrous, purple-red, darker towards the tips, the centre to half-way up the lobes marked with numerous pale yellow, transverse lines; ligulæ dull brownish-red or dark purple-brown; peduncles two lines long, three to five-flowered; pedicels eight to ten lines long. Stems erect, branching at base, 6in. to 8in. high, seven to nine lines thick, puberulous, with concave sides, and stout, short, nearly horizontal, teeth. Before 1877. (G. C. n. s., vii. p. 430.)

S. bufonis (toad-like). A synonym of *S. normalis.*

S. campanulata (bell-shaped). A synonym of *Huernia campanulata.*

S. Corderoyi (Corderoy's). A synonym of *Duvalia Corderoyi.*

S. Courcelli (Courcell's). A garden synonym of *S. patentirostris.*

S. Curtisii (Curtis's). *fl.*, corolla much spreading, deeply five-cleft; segments sulphur-colour, with transverse, oblong spots of dark blood-colour, ovate, acuminate, glabrous; tube yellowish; peduncles one-flowered, reflexed. June to September. Branches tetragonal, with acute, or slightly reflexed, teeth. *h.* 1ft. 1690. (B. M. 26 and R. H. 1857, p. 43, under name of *S. variegata.*)

S. deflexa (deflexed). *fl.*, corolla deeply five-cleft, about 2in. in diameter; segments lanceolate, acute, dingy greenish or pale reddish, ciliated, revolute on the margins, wrinkled; pedicels on a short and thick peduncle, much spreading, one-flowered. Summer. Branches ascending, erect, glabrous, tetragonal, with erect teeth on the angles. 1815. *h.* 4in. to 6in. (B. M. 1890; L. B. C. 135.)

S. divaricata (divaricate-branched). *fl.*, corolla greenish-brown outside, flesh-coloured within, tipped with green, glabrous, shining; segments lanceolate, spreading, with revolute, ciliated edges; corona orange, the outer segments mucronate; pedicels twin or tern. June to November. Branches numerous, tetragonal, glabrous, gradually attenuated, with small, erect teeth. *h.* 6in. 1793. (B. M. 1007; L. B. C. 941.)

S. eruciformis (caterpillar-like). A garden synonym of *S. olivacea.*

S. gemmiflora (bud-flowered). *fl.*, corolla large; segments dark fuscous, spotted with yellow at the throat, transversely and loosely wrinkled, ovate, acute; peduncles two or three. October and November. Branches many, erect, tetragonal, with sub-erect, acute teeth. *h.* 6in. 1795. (B. M. 1839.)

S. gigantea (gigantic). *fl.* pale yellowish, covered with irregular, brownish-red lines, and suffused with reddish around the corona, of an enormous size, 12in. to 14in. in diameter, the surface wrinkled, and sparsely covered with short, pale hairs; lobes lanceolate, acuminate, the margins fringed with similar hairs; corona dark purplish-brown. Stems resembling those of *S. Plantii.* *h.* 6in. 1862. The finest plant of the whole genus. (G. C. n. s., vii. p. 693.)

S. glabriflora (glabrous-flowered). *fl.*, corolla deeply five-lobed; lobes lanceolate, acuminate, at first spreading, and then 3in. to 4in. in diameter, afterwards strongly reflexed, the face entirely glabrous without a fringe, dull red-purple, with numerous transverse, yellowish-white lines; corona dark purple-brown, the ligulæ linear, concave, recurved at apex, obtuse, with a minute tooth; wings free to the base, divergent, oblong, obtuse; pedicels ¾in. long, pubescent. Stems pubescent, erect, quadrangular. *h.* 4in. to 8in. 1862. This is known in gardens as *S. grandiflora minor.* (G. C. n. s., vi. p. 809.)

S. grandiflora (large-flowered). *fl.* large, rather flat; corolla dark purple at the bottom, but the ovate-lanceolate segments are of a lighter purple, ciliated with grey hairs, and striped with white; peduncles three-flowered. September to December.

Stapelia—*continued.*

Branches quadrangular, clavate, downy, with remote tubercles or teeth. *h.* 1ft. 1795. Plant grey from down. See Fig. 522. (R. H. 1858, p. 152.)

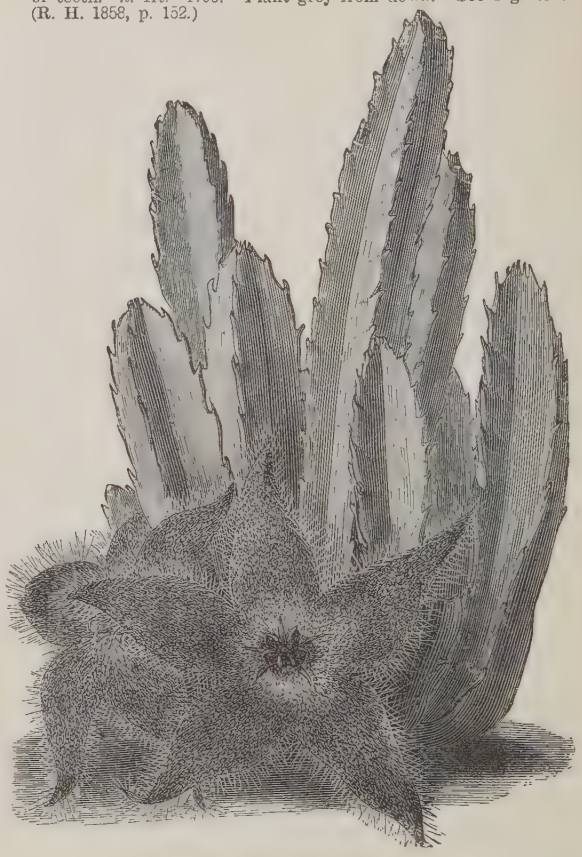


FIG. 522. STAPELIA GRANDIFLORA.

S. g. lineata (lined). This only differs from the type in the corolla lobes being marked across the basal half with yellow lines. 1873. (G. C. n. s., vii. p. 559.)

S. g. minor (lesser). A garden synonym of *S. glabriflora.*

S. Gussoniana (Gussone's). A synonym of *Boucerosia europæa.*

S. hamata (hooked). *fl.*, corolla blood-coloured, 3in. across, flat, ciliated, wrinkled above, with a hairy centre; segments transversely striped with white, acuminated, ciliated with red hairs; outer coronal segments emarginate, the inner leaflets linear-subulate, hooked. July and August. Branches erect, tetragonal, shining green; young ones sulcate; adults flatter, with short, erect or incurved, pale teeth. *h.* 3in. 1820. (L. B. C. 242.)

S. hirsuta (hairy). *fl.*, corolla yellowish, with transverse, deep violet stripes, a pale red, villous bottom, and red nectaries, wrinkled; segments villously ciliated with white hairs: outer coronal segments acute, lanceolate, the inner leaflets spreading. July and August. Branches erect, slightly villous, dingy green, sulcate-tetragonal, floriferous at the base, the angles having erect teeth. *h.* 6in. 1710. (H. E. F. 230.) The variety *atra* has deep purple flowers. (B. R. 756.)

S. lævis (smooth). *fl.* showy; corolla segments lanceolate, acute, green beneath, purple above, yellowish at apex, dotted with dark red; peduncles long, one-flowered; inner coronal leaflets carunculate. June to November. Branches stout, and, as well as the branchlets, oblong, smooth, obscurely sulcate, not toothed. *h.* 3in. 1790. (B. M. 793, under name of *S. pedunculata.*) SYN. *Caruncularia pedunculata.*

S. maculosa (spotted). *fl.* very fœtid; corolla smooth, ciliated; segments dirty yellow, red at the tips and edges, almost covered by large, confluent, rufous spots, ovate, acute; orb waved, elevated, downy; peduncles three or four, aggregated at the bases of the younger branches. June to September. Branches very numerous, erect, glabrous, green: adults loosely pubescent, tetragonal, with spreading teeth. *h.* 1ft. 1804. (B. M. 1833.)

S. Massoni (Masson's). *fl.* 4in. to 4½in. in diameter; corolla brownish-purple, marked with a few, narrow, yellowish lines on the glabrous lobes, and the disk thickly covered with fine, short,

Stapelia—*continued.*

purple hairs. July. Branches quadrangular, pubescent. An old garden plant.

S. mutabilis (changeable). *fl.*, corolla greenish-yellow, with numerous transverse, purple stripes, ciliated with red, clavate, tremulous hairs; inner branch of the inner corona clavate; ligulæ three-toothed; peduncles usually in twos or threes. June and July. Branches erect, tetragonal, narrow, with erect, obtuse teeth. *h.* 6in. 1823.

S. namaquensis (Namaqualand).* *fl.* large; corolla bright yellow, with crowded and more or less confluent, dark purplish-brown spots; lobes much wrinkled, not fringed; outer coronal lobes entire, acute. Branches thick, glabrous, beautifully mottled. *h.* 3in. to 4in. 1883. One of the handsomest species.

S. n. tridentata (three-toothed). *fl.* having the corolla lobes fringed with short hairs, and the outer coronal lobes truncately three-toothed at apex. 1883.

S. normalis (normal). *fl.*, corolla much spreading, 2in. or more in diameter; segments yellow, with transverse stripes and spots of dark blood-colour, ovate, acute, outwardly of a pale sulphur-colour, lined; peduncles solitary, one-flowered, much spreading. July and August. Branches many, declinate or ascending, glabrous, tetragonal, with much-spreading teeth. *h.* 6in. 1821. (B. R. 755; B. M. 1676, under name of *S. bufonis.*)

S. olivacea (olive-coloured). *fl.* very fœtid, two to six from the bases of the younger branches; corolla dull green and puberulous outside, glabrous within, with numerous crowded, brown, transverse rugæ on a dark olive-green or sometimes pale olive ground, about 1½in. in diameter; coronal scales dark purple-brown; peduncles two to three lines long. September. Stems erect, rather slender, branching at base, minutely puberulous, 3in. to 5in. high, ⅜in. to ½in. thick, with rounded edges, becoming blotched with purple on full exposure to the sun. 1874. (B. M. 6212; G. C. n. s., iii. p. 137.) SYN. *S. eruciformis* (of gardens).

S. orbicularis (orbicular). *fl.*, corolla pale yellow, having approximate, brownish lines on the segments, much spreading; segments cordate, recurved at apex, acuminate, striate-wrinkled; orb yellow, dotted with brown, tumid; peduncles near the base of the branchlets, solitary, one-flowered. July to November. Branches many, erecto-patent, tetragonal, with mucronulate teeth. *h.* 6in. 1799. (A. B. R. 439; F. d. S. 1281; L. B. C. 811.)

S. patentirostris (spreading-beaked). *fl.* one to three together, on pedicels 1½in. long; corolla 2½in. to 3½in. in diameter, the face wrinkled, rich dark purple-brown, with numerous transverse, yellowish lines on the basal part of the lanceolate, acuminate lobes, the centre densely villous with rich purplish-red hairs, the lobes fringed with long, pale purple hairs; ligulæ linear-lanceolate, obtuse, with a central tooth; wings linear-oblong, horizontal; rostra subulate, horizontally recurved over the wings, reaching nearly to the sinuses of the corolla. Autumn. Stems rather slender, puberulous, toothed. *h.* 6in. 1870. Also cultivated under the name of *S. Courcelli.* (G. C. n. s., vii. p. 140; B. M. 5963, under name of *S. sororia.*)

S. pedunculata (long-peduncled). A synonym of *S. lævis.*

S. picta (painted). *fl.*, corolla sulphur-coloured, marbled and spotted with dark blood-colour; segments ovate, acuminate; wrinkled; orb elevated, much wrinkled, depressed in the middle; peduncles from the base of the branchlets, solitary, one-flowered. June to September. Branches simple, erect, tetragonal or quadri-sulcate, slightly torulose. *h.* 6in. 1799.

S. pilifera (bristle-bearing). A synonym of *Trichocaulon pilifera.*

S. planiflora (flat-flowered). *fl.*, corolla much spreading, half-quinquefid; segments pale sulphur-coloured, lined and spotted with dark purple, ovate, acuminate, transversely wrinkled; peduncles from the axils of the younger branchlets, solitary or twin, one-flowered. July to November. Branches many, branched, ascending or nearly erect, glabrous, sulcate-tetragonal, with much-spreading teeth. 1805. (L. B. C. 191.)

S. Plantii (Plant's). *fl.* on stout, pubescent peduncles; corolla 5in. in diameter, villous round the throat; lobes purplish-brown in the centre, and there transversely barred with wavy, yellow bands, broadly black-purple at apex and on the margins, 1in. to 1½in. broad, ovate-lanceolate, ciliated with long hairs. November. Stem stout, creeping; branches downy, 5in. to 9in. long, erect, columnar or sub-clavate, with four thick, remotely-toothed wings. 1866. (B. M. 5692; F. d. S. 2012.)

S. pulvinata (cushion-flowered). *fl.*, corolla deep violet, large, flat, elevated and very villous at the bottom; segments variegated with whitish, transverse wrinkles, fuscous and concave at the apex, rufous beneath, roundish, abruptly acuminate, ciliated; peduncles mostly solitary, terete, from the axils of the branchlets. June to November. Branches and branchlets many, reclinate, with erect, green teeth. 1795. A very elegant species. (B. M. 1240; L. B. C. 206.)

S. revoluta (revolute-flowered). *fl.* sub-solitary, on very short peduncles; calyx segments acute; corolla red, with whitish blotches, smooth, very fleshy, the segments revolute, with fringed margins. July. Branches tetragonal, erect, denticulated, the sides hollowed out. 1801. (B. M. 724.)

S. rufa (rufous). *fl.*, corolla glabrous; segments of an obscure violet, variegated with deep purple or pale red, transverse stripes, having the bottom stellate, rufous, and variegated, the margins ciliated with dark violet hairs; peduncles two or three together, short, purplish. June to November. Branches erect,

Stapelia—*continued.*

tetragonal, with small, erect, obtuse teeth. *h.* 3in. to 6in. 1795. (L. B. C. 239.)

S. Simsii (Sims'). *fl.*, corolla ample, flat, glabrous; segments dark violet, with slender, whitish lines about the throat, without greenish or obscurely tinged with violet, ovate, acuminate, five-nerved; peduncles erect, at the tips of the branchlets. May to November. Branches glabrous, the angles obsoletely nippled, toothed; teeth having a green, deciduous acumen. *h.* 3in. to 6in. 1800. (B. M. 1234, under name of *S. vetula.*)

S. sororia (sisterly).* *fl.* 3in. to 4½in. in diameter; corolla clothed with long hairs; lobes dark vinous-purple, ovate, acuminate, transversely wrinkled, the folds towards the base bright orange-yellow; processes of the column deep purple; peduncles solitary or twin, 3in. to 4in. long. July. Stems 6in. to 10in. high, with erect or horizontal branches ⅛in. to ⅜in. in diameter, the angles toothed at intervals of ⅛in. to ⅜in., the teeth soft and incurved. 1797. Plant pale green, glabrous, variable in size. (L. B. C. 94.)

S. spectabilis (showy). *fl.*, corolla large, flat; segments ovate-lanceolate, furnished from the base behind the middle with dense, red hairs, and having pale stripes on the upper surface, with black tips. November to January. Branches quadrangular, clavate, toothed on the angles, the teeth remote, incurved, whitish. *h.* 1ft. 1802. (B. M. 585, under name of *S. grandiflora.*)

S. stricta (straight). *fl.*, segments of corolla purple, with pale greenish margins, ovate, acuminate, nearly flat, glabrous, not ciliated; peduncles growing from the base of the branches. June to November. Branches tetragonal, smooth, simple, straight. *h.* 3in. 1814. (B. M. 2037.)

S. tsomoensis (Tsomo River). *fl.*, calyx lobes ¼in. long; corolla 3in. in diameter, the face entirely dull smoky-purple, darker at the tips of the lobes, or with some of the ridges greenish or dirty-yellowish, the disk and base of the lobes covered with purple hairs; lobes ovate-lanceolate; outer coronal segments purplish-black; pedicels ⅜in. to 1in. long; cymes sub-sessile, four to nine-flowered. Summer. Stems 4in. to 6in. high, five to eight lines thick, the angles compressed, repand-toothed, very minutely puberulous. 1882.

S. unguipetala (claw-petaled). *fl.* 4in. to 4½in. in diameter; corolla rich purple-brown, marked two-thirds the way up the lobes with transverse, yellowish lines, the centre of the disk and five bands radiating to the sinuses, pale greenish-ochre; lobes lanceolate-attenuate, incurved-hooked at apex, fringed with long, pale purplish hairs, and the disk covered with long, silky, purplish-red hairs, the rest glabrous; ligulæ lanceolate, acute, and, as well as the free, deltoid-oblong wings and the recurving rostra, dark purple-brown. *h.* 6in. 1877. Allied to *S. patentirostris.* (G. C. n. s., vii. p. 335.)

S. variegata (variegated). A synonym of *S. Curtisii.*

S. vetula (oldish). A synonym of *S. Simsii.*

STAPHIDIASTRUM. A synonym of **Sagræa** (which *see*).

STAPHIDIUM (in part). Synonymous with *Clidemia.*

STAPHYLEA (from *staphyle*, a cluster; alluding to the disposition of the flowers and fruits). Bladder-nut Tree. SYN. *Bumalda.* ORD. *Sapindaceæ.* A small genus (five species) of hardy, branched shrubs, natives of Europe, the Himalayas, Japan, and North America. Flowers white, erect or pendulous, in axillary racemes or panicles; sepals five, equal, deciduous; petals five, erect, about as long as the calyx, imbricated; stamens five; pedicels bracteate, articulated. Capsule membranous, bladder-like. Leaves opposite, stipulate, three to five-foliolate or pinnate; leaflets involute in vernation, stipellate. The under-mentioned species thrive in ordinary soil. *S. colchica* is an excellent subject for forcing, when specially prepared for the purpose. Propagation may be effected, in autumn, by suckers, by layers, or by cuttings.

S. Bolanderi (Bolander's). *fl.*, sepals three lines long; petals a little longer; style and stamens much exserted. *l.*, leaflets three, glabrous, broadly oval or orbicular, abruptly acute, serrulate. California, 1883.

S. Bumalda (Bumalda). *fl.*, styles villous. June to August. *fr.*, capsule with two beaks. *l.* trifoliolate; leaflets oblong, acuminate, rather scabrous; serratures awned, protruding from the recesses of the crenæ. *h.* 6ft. Japan, 1812. (S. Z. F. J. 95.)

S. colchica (Colchican).* *fl.* seven to eight lines long; sepals and petals linear-spathulate, the former spreading; raceme terminal, erect or slightly nodding, compound, ovate, corymbose. Summer. *l.* ternate and pinnately five-foliolate, 4in. to 5in. long; leaflets approximate, ovate-oblong, acuminated, serrulated, puberulous towards the base beneath. *h.* 3ft. to 5ft. Caucasus. See Fig. 523. (G. C. n. s., xi. 117; R. G. 837; R. H. 1870, 257.)

S. pinnata (pinnate).* Job's Tears; St. Anthony's Nut. *fl.* in racemes. May and June. *fr.*, nuts globose, white, pistachio-

Staphylea—*continued.*

flavoured, in a bladdery capsule. *l.* pinnate, of five to seven oblong, glabrous, serrated leaflets. *h.* 6ft. to 12ft. South Europe. (Sy. En. B. 322.)

S. trifolia (three-leaved). *fl.*, petals obovate-spathulate, ciliated at base. May and June. *fr.*, nuts globose. *l.* trifoliolate; leaflets ovate, acuminate, regularly serrated, pubescent when young. *h.* 6ft. to 12ft. North America, 1640.

FIG. 523. FLOWERING BRANCH OF STAPHYLEA COLCHICA.

STAPHYLEÆ. A tribe of *Sapindaceæ.*

STAPHYLINIDÆ. A family of the large group of *Brachelytra*, the "Rove" or "Cocktail" Beetles. The species of this group agree in having the wing-cases,

FIG. 524. DEVIL'S COACH HORSE (GOERIUS or OCYPUS OLENS).

or elytra, very short (see Fig. 524), as indicated by the scientific name, which is derived from *brachys*, short, and *elytra*, the wing-cases. Their wings are, nevertheless, large, and have, accordingly, to be folded up, and packed away below the elytra. The hinder end of the bare abdomen is employed to help in this, being turned up to push the wings under their covers; hence, they are often called Cocktail Beetles. The name Rove

Staphylinidæ—*continued.*

Beetles refers to their active roving habits. There are many genera in the family *Staphylinidæ*, but they mostly differ too little to be distinguished by anyone save a practised entomologist. Few of them are over ½in. in length, though one or two exceed 1in.; many are microscopic in size. They are very often black, but frequently this is varied with yellow, reddish-brown, or rusty-red. These beetles vary greatly in habits. They are very abundant, and are, accordingly, to be met with everywhere. Towards the end of summer, they may be found crawling on the ground or on walls and palings, or on the wing; and the small species are but too familiar from their liability to fly into one's eyes or mouth. Over 200 species are known to occur in Britain. They may often be found in the utmost profusion in the dead bodies of animals, or in decaying remains of plants, both as larvæ and in the perfect state. Some of them are among the most efficient allies of gardeners, because of their influence in destroying noxious insects. None of them are injurious to healthy garden produce. The two species figured, viz., *Goerius olens*, or the "Devil's Coach Horse," and *Staphylinus*

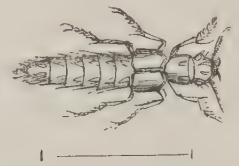


FIG. 525. STAPHYLINUS ERYTHROPTERUS (slightly magnified).

The Line shows the actual length of the Insect.

erythropterus (see Figs. 524 and 525) give a fair idea of the appearance of the family. The former preys on insects.

STAR APPLE. *See* **Chrysophyllum.**

STARCH. The greater part of the food material stored up by green plants for future use in their nourishment, and in the formation of new tissues, is formed of Starch. In those parts of plants in which food is stored, *e.g.*, in the tubers of Potatoes, in the pith of many plants, and in the albumen (or perisperm) in seeds of Cereals, Peas, and many other plants, Starch is very abundant, packed away in the cells in the form of small grains. These grains are frequently rounded, but may assume peculiar forms characteristic of certain plants. When very numerous, they become polygonal by mutual pressure. Under the microscope, each granule is seen to have a dark point, called the *hilum*, at one place; and around this are light and dark layers alternately. This appearance of layers, it is believed, is due to their containing a varying amount of water, as it is not apparent when the grains are either saturated or thoroughly dried. Often two or more granules are more or less completely united, forming "compound" granules. Though always small, they vary greatly in size in different plants. They are most readily recognised by running a solution of Iodine and Potassic Iodide under the cover-glass, when the granules become some shade of indigo-blue, varying with the strength of the solution. Starch consists of Carbon, Hydrogen, and Oxygen, in the proportions indicated by its chemical formula, $C_6H_{10}O_5$. This composition is the same as that of cellulose, the substance of which cell-walls are composed; and it is very nearly the same as that of several of the sugars, into which Starch is converted by a kind of slight fermentation. Starch is produced in the presence of light in the chlorophyll-bodies, and, therefore, only in the green parts of plants.

Starch—*continued.*

There is much doubt as to the exact part played by chlorophyl; most botanists believe that it forms the Starch granules, but others follow Pringsheim in thinking that the chlorophyl is only a shield against exposure to too intense light of the protoplasm, which they regard as the actual agent in the production of Starch. Whichever view is correct, the Starch is largely built up from the Carbon and Oxygen of Carbonic Acid gas in the atmosphere. The granules are not soluble in water, so, when there is need to convey Starch from one part of the plant to another, it is changed into a sugar, which is soluble, and, in this form, passes along to where it is to be used in building up new cell-walls, or where it must be stored up for a time. In the latter case, the Starch granules are again formed by the action of small pieces of protoplasm, named Starch-generators, which are fixed to the part of each granule farthest from the *hilum*.

STARFISH FLOWER. *See* **Stapelia Asterias.**

STAR FLOWER. A common name for several species of *Aster*, *Sternbergia*, *Trientalis*, and *Triteleia*.

STAR HYACINTH. *See* **Scilla amœna.**

STARKEA. A synonym of **Liabum** (which *see*).

STAR OF BETHLEHEM. *See* **Ornithogalum umbellatum.** The name is also applied to other species.

STAR OF NIGHT. A common name for *Clusia rosea*.

STARRY. Arranged in rays like the points of a star.

STAR, SEA. A popular name for *Aster tripolium*.

STARWORT. A common name for **Aster** and **Stellaria** (which *see*).

STATICE (the Greek name, used by Pliny for some astringent herb; from *statikos*, astringent). Sea Lavender. SYN. *Taxanthema*. ORD. *Plumbagineæ*. A large genus (upwards of 120 species have been described) of greenhouse, half-hardy, or hardy herbs, sub-shrubs, or shrubs, chiefly inhabiting saline districts and shores of temperate seas, most commonly found in Western Asia. Flowers one or two in the bracts, or often in few-flowered, many-bracted spikelets; calyx usually funnel-shaped, with a scarious, spreading limb; petals connate with the stamens in a ring towards the base, or free to the base; bracts subtending the spikelets, small, scale-like; peduncles or scapes leafless, often branched, cymose, corymbose, or paniculate. Leaves in the stemless species radical and rosulate, in the tufted sub-shrubs clustered, in the small shrubs somewhat scattered at the sides of the branches, alternate, flat, sometimes entire, linear, spathulate, oblong, or obovate, sometimes sinuately pinnatifid or dissected. *S. auriculæfolia*, *S. bellidifolia*, and *S. Limonium*, are included in the British Flora. The hardy species thrive in sandy soil, in the open border, or on rockwork. Their flowers are excellent for cutting, and for intermixing with other flowers in glasses, &c.; they are also well adapted for drying like everlastings. Annual and biennial species may be propagated from seeds, sown in early spring, in a frame, the young plants being put out into their permanent 'places' when large enough. The perennials may also be raised from seeds when any are procurable, or increased by means of careful division. Greenhouse Statices are very useful and ornamental plants, nearly always more or less in flower. They succeed in good, turfy loam, with a little charcoal or sand intermixed, and may be increased by cuttings, inserted in small single pots, during early spring, and placed under a bell glass.

A selection of the most popular species, from a horticultural standpoint, is given below. Except where otherwise stated, the plants are herbaceous perennials.

Statice—*continued.*

S. ægyptiaca (Egyptian). A synonym of *S. Thouini*.

S. arborescens (tree-like).* *fl.* blue; spikelets two-flowered, few, in short, secund, rather loose spikes; floral branches very short; scape tall, branched above, ample and sub-corymbosely panicled. July. *l.* ample, ovate-oblong, petiolate, obtuse, mucronate, attenuated at base. Stem branched above, at length leafy. *h.* 2ft. Teneriffe, 1829. Greenhouse shrub. (B. 47; B. M. 3776; B. R. xxv. 6 and P. M. B. iv. 217, under name of *S. arborea*.)

S. Bonduelli (Bonduelle's). *fl.* yellow, sessile, in terminal corymbs; peduncles repeatedly dichotomous, clavate; bracts scarious. June. *l.* radical, lyrate, attenuated to the petioles, dilated at apex, terminating in a subulate mucro, pilose above, villous beneath. Stems tufted, branched, hairy at base. *h.* 1ft. North Africa, 1859. Greenhouse. (B. M. 5158; F. d. S. 2129; R. G. 318; R. H. 1885, p. 276.)

S. Bourgæi (Bourgeau's). *fl.* purple and white; spikelets one or two-flowered, two or three in fascicles at the extremities of the branchlets; lower bracts slightly reddish; scape compressed, 6in. to 12in. high, corymbosely paniculate above. August. *l.* ample, petiolate, stellate-puberulous, oblong, attenuated at base, slightly sinuate or often lyrate, the terminal lobe ovate, obtuse, mucronate. Canary Islands, 1859. Greenhouse sub-shrub. (B. M. 5153; F. d. S. 2292.)

S. brassicæfolia (Brassica-leaved). *fl.* purple; spikelets two-flowered, two or three fasciculate at the tips of the branchlets; lower bracts rufous, puberulous; scape angled, paniculately corymbose above. August. *l.* few, slightly ciliated on the margins, petiolate, lyrate; terminal lobe large, roundish-ovate, often irregularly lobed, very obtuse, cuspidate, sub-cordate at base; lateral ones two to four, ear-like, small, alternate, often confluent at base. *h.* 1½ft. Canary Islands, 1859. Greenhouse sub-shrub. (B. M. 5162.)

S. callicoma (beautiful-haired).* *fl.* pink; spikelets two-flowered, in short, rather broad, distichous spikes; scape dwarf; panicle ovate-triangular, sub-secund, the branches triquetrous. July. *l.* oblong and oblong-lanceolate, attenuated into the petioles, mucronate, white-tubercled, puberulous or glabrous. *h.* 1ft. Russia, 1804. Half-hardy. (R. G. 1063; B. M. 1629, under name of *S. conspicua*.)

FIG. 526. STATICE ELATA.

S. elata (tall).* *fl.* blue; spikelets two-flowered, in ovate, distichous, rather loose, imbricated spikes; bracts ovate, white-margined; scape 2ft. high, elongated-paniculate above, the branches hairy, triquetrous. July. *l.* obovate, very obtuse, often retuse and shortly mucronate at apex, rather long-attenuated into the petioles. Southern Russia, 1820. Hardy. See Fig. 526.

S. eximia (choice). *fl.* lilac, rose; spikelets about four-flowered, disposed in very dense, scorpioid-capitate, much-imbricated spikes; bracts pubescent; scape tall, paniculate or branched above, terete, pubescent. August. *l.* oblong or obovate, obtuse, shortly petiolate, narrowed, slightly crisped on the margins, long-attenuated into the petioles. *h.* 1ft. Songoria, 1844. Hardy. (B. R. 1847, 2.)

S. floribunda (bundle-flowered).* *fl.* violet-blue, produced in dense heads. 1882. A handsome plant, much resembling *S. profusa*.

S. Fortunei (Fortune's). A synonym of *S. sinensis*.

S. fruticans (shrubby). *fl.* blue; spikelets one or two-flowered, very few, in secund, very short, imbricated spikes; lower bracts ciliate-margined; scape 4in. to 6in. high, corymbose-paniculate or branched above, puberulous, closely compressed. Summer. *l.* near the base of the scape, ovate, 1½in. to 2in. long, ob-

Statice—*continued.*

tuse, mucronate, shortly attenuated into the petioles. Stem short, naked, terete. Canary Islands, 1847. Half-hardy shrub. (R. G. 319; F. d. S. 325, under name of *S. frutescens.*)

FIG. 527. STATICE SINUATA, showing Habit and detached Inflorescence.

S. Halfordi (Halford's). A garden variety of, or hybrid from, *S. macrophylla.*

S. imbricata (imbricated). *fl.* blue; spikelets three or four-flowered, few, in short, fascicled spikes; bracts velvety; scape tall, amply corymbose above, with undulated and broadly winged branches. Summer. *l.* lanceolate, lyrate-runcinate, with eight or nine lobes on each side, setose-mucronate, 9in. to 10in. long. *h.* 1½ft. Teneriffe, 1829. A half-hardy, slightly tomentose sub-shrub. (F. d. S. 320, 321.)

S. incana (hoary), of Bieberstein. A synonym of *S. tatarica angustifolia.*

S. Kaufmanniana (Kaufmann's). *fl.* pink; scape 6in. to 16in. long, bearing several ascending spikes. Summer. *l.* all radical, lanceolate, acuminate, crisped, with thick margins. *h.* 1ft. Turkestan, 1880. A pretty, hardy perennial. (R. G. 996.)

S. latifolia (broad-leaved).* *fl.* blue; spikelets one (rarely two) flowered, rather remote, forming loose, very slender, slightly recurved spikes; bracts glabrous; scape tall, much-branched; panicle ample, effuse. June. *l.* large, oblong-elliptic, obtuse, long-attenuated into the petioles. *h.* 1ft. South Russia, 1791. Hardy.

S. leptoloba (slender-lobed). *fl.*, calyx purple, stellate, funnel-shaped; corolla yellowish, small; spikes about ½in. long, few-flowered; scape slender, repeatedly forked. Summer. *l.* all radical, oblanceolate-spathulate. Turkestan, 1881. Habit tufted. Hardy. (R. G. 1045.)

S. macrophylla (large-leaved).* *fl.* white, twice as large as those of *S. arborescens*; spikelets two-flowered, twin, erect, at the tips of the branchlets; bracts velvety, the lower ones scarious-rufescent; scape tall, amply and much branched above, in a corymbose panicle. May. *l.* nearly glabrous, large, sessile, obovate-spathulate, very obtuse, the lower part long-attenuated, obsoletely sinuate. *h.* 2ft. Teneriffe, 1824. Half-hardy sub-shrub. (B. M. 4125; B. R. xxxi. 7.)

S. macroptera (large-winged). *fl.* purple; spikelets two-flowered, in fascicles of two or three at the tips of the branchlets; wings of the floral branches very broad; scape tall, ample and spreading, very broadly paniculate-corymbose. Summer. *l.* slightly puberulous, at length glabrescent, ample, coriaceous, petiolate, lyrate; terminal lobe large, ovate, slightly acute, bristle-bearing at apex, sinuate-lobed; lateral ones much smaller, confluent. *h.* about 2ft. Canary Islands. Greenhouse. (I. H. iii. 105.)

S. pectinata incompta (comb-like, inelegant). *fl.* blue; spikelets three-flowered, distichous, in oblong, sub-scorpioid, spreading, densely-imbricated spikes; lower bracts rufescent; scape leafy, decumbent. September. *l.* rosulate at the base of the scape, or fascicled or solitary near the axils of the scales, obovate, obtuse or retuse, mucronate, attenuated into the petioles. Canary Islands, 1780. A half-hardy, calcareous-dotted sub-shrub. (B. R. xxvi. 65, under name of *S. pectinata.*)

Statice—*continued.*

S. profusa (profuse).* *fl.* disposed in well-branched, corymbose heads; calyx purple; corolla white. August. *l.* radical, 6in. to 8in. long, oval or somewhat spathulate, waved, leathery, shining, and dark green; outer ones prostrate. *h.* 2ft. A greenhouse hybrid between *S. puberula* and *S. Halfordii.* (F. M. 40.)

S. puberula (puberulous). *fl.* violet, as large as those of *S. arborescens*; spikelets two-flowered, few, at the tips of the branchlets, sub-distichous and rather loosely fascicled; bracts scarious-rufescent, pubescent; scape 3in. to 5in. high, paniculately corymbose. July. *l.* ½in. to ¾in. long, ovate-rhomboid, slightly acute, bristle-bearing at apex, long-ciliated on the margins, shortly attenuated into the petioles. Graciosa, 1830. A whitish-pilose or puberulous, half-hardy sub-shrub. (B. 182; B. M. 3701; B. R. 1450.)

S. pumila alba. A mere garden name.

S. rosea (rosy).* *fl.* blue; spikelets one-flowered, clustered in short, terminal, horizontal spikes, with a flexuous rachis; bracts blackish, with white margins; scape terete, much-branched, paniculately corymbose above, tuberculate-scabrous. May. *l.* obovate-oblong, attenuated into the petioles, rough-tubercled on both sides. Stem short, leafy. *h.* 3ft. Port Natal, 1840. Half hardy sub-shrub. (B. M. 4055, under name of *S. rytidophylla.*)

S. rytidophylla (shrivelled-leaved). A synonym of *S. rosea.*

S. sinensis (Chinese). *fl.* yellow; spikelets two-flowered, in short, sub-secund, terminal spikes; lower bracts ovate, obtuse; scape tall, dichotomously branched just above the base, corymbose-fastigiate. April. *l.* obovate-lanceolate, obtuse, long-attenuated into the petioles. Stem acutely angled. *h.* 1ft. China, 1845. Plant hardy, glabrous. (B. R. 1845, 63, and F. d. S. ii. 28, under name of *S. Fortunei.*)

S. sinuata (sinuate-leaved).* *fl.* purple, yellow; spikelets three or four-flowered; spikes short, secund, nearly horizontal, the upper branchlets densely imbricated; lower bracts reddish; scape dichotomous, paniculately corymbose, three to five-winged. August. *l.* lyrate-pinnatifid, with rounded lobes, the terminal ones bristle-bearing. *h.* 1ft. Levant, 1629. Half-hardy. See Fig. 527. (B. M. 71; S. F. G. 301.)

FIG. 528. STATICE SUWOROWI.

Statice—*continued.*

S. spathulata (spathulate-leaved). *fl.*, calyx white; corolla purple, obcordate, larger than the calyx; spikes in two rows; scape and branches perfectly round. August. *l.* radical, spathulate, obtuse, glaucous, entire. *h.* 1ft. Barbary, 1804. Hardy. (B. M. 1617.)

S. speciosa (showy). *fl.* white; spikelets three or four-flowered, in very short, scorpioid-capitate, distichous and very densely imbricated spikes; scapes densely corymbose above. July. *l.* nearly orbicular or oblong-obovate, abruptly attenuate-cuspidate, shortly narrowed at base. *h.* 1ft. South Russia, 1776. Half-hardy. (B. M. 656; L. B. C. 1336.)

S. spicata (spike-flowered). *fl.* pink or white; corolla lobes ovate; spikelets two to four-flowered; spikes terminal, or often many, sessile, cylindrical, very dense. Summer. *l.* rosulate, glabrous or slightly hairy beneath, oblong-lanceolate, long-attenuated into a short petiole, obtuse, mucronate, entire or laciniate. *h.* 6in. Asia, 1819. Hardy annual.

S. Suworowi (Suworow's).* *fl.* of a pretty lilac-colour, produced in dense, branched spikes. Summer. *l.* radical, oblong-lanceolate, entire or coarsely runcinate. Turkestan, 1883. A strikingly beautiful, hardy annual. See Fig. 528. (G. C. n. s., xx. p. 393; R. G. 1095, f. 1-2.)

FIG. 529. STATICE TATARICA.

S. tatarica (Tartarian).* *fl.* bright ruby-red, ⅛in. long; spikelets sub-unilateral on the branches, one to three-flowered; scape stiff, erect, 2in. to 3in. long, soon giving off a long, broad, recurved panicle. June and July. *l.* tufted, 4in. to 6in. long, oblong, spathulate, or oblanceolate, acuminate, mucronate, rigid, glabrous, narrowed into the petioles. *h.* 1ft. South-east Europe, 1731. Hardy. See Fig. 529. (B. M. 6537.)

S. t. angustifolia (narrow-leaved). A variety with narrower leaves than the type. SYN. *S. incana* (of Bieberstein).

S. Thouini (Thouin's). *fl.* yellow; spikelets two or three-flowered; spikes secund, very short, angled, straight; scape corymbose above, more or less broadly three-winged, sub-dichotomous. May. *l.* sinuate or lyrate-pinnatifid, the lobes and sinuses rounded, the margins shortly ciliated. *h.* 1½ft. Teneriffe, Greece, Palestine, North Africa, &c., 1829. A half-hardy, glaucescent annual. SYN. *S. ægyptiaca* (B. M. 2363).

STATUARY. Like some other descriptions of garden furniture, Statuary requires to be associated with special accessories, in harmony with it. Statuary can seldom be introduced with entire satisfaction, except when associated with architectural or geometrical lines. Such positions may be found in terrace gardens, along the sides of long, straight walks, or as a terminal object to such walks or at places where they intersect, and sometimes, with good effect, at the end of a vista or avenue. It is seldom out of place in the conservatory, where, even should it not be introduced with faultless taste, it is less likely to absolutely offend, than a puerile attempt at rockwork

Statuary—*continued.*

and waterfall. As to the size of the groups and figures to be introduced into a given space, this must be determined on the spot; and, in order to arrive at a proper decision in so important a matter, it is a good plan to set up outlines, simply constructed of rough boards, and then to diminish or enlarge them, until they appear in harmonious proportion to the general features of the situation. The choice of subjects will be determined by the taste of the proprietor, or those whom he consults, and the expense to be incurred. When the latter does not permit of the introduction of marble or real stone, recourse may be had to the very good artificial stone or terra-cotta objects which have been found to stand the test of exposure.

It may be here remarked that Statuary, when exposed to the atmosphere, may be rendered more durable by the application of one of the patent colourless solutions sold for such purposes; but, for obvious reasons, paint should not be used.

STAUNTONIA (named after Sir George Staunton, a traveller in China). ORD. *Berberideæ*. A small genus (two species) of ornamental, hardy, evergreen, climbing shrubs, natives of China and Japan. Flowers monœcious; sepals six, petaloid, the outer ones broader; petals none; stamens six; racemes axillary, few-flowered. Leaves digitately three to seven-foliolate. One of the species is in cultivation. It thrives in sandy loam, and may be increased by cuttings of young, half-ripened shoots, inserted in sand. In autumn, the long, trailing shoots should be cut back, leaving only those from which flowers are desired.

S. hexaphylla (six-leafleted). *fl.* white, fragrant. April. *l.* composed of six firm, deep green, elliptic-ovate, acute leaflets. 1876. (G. C. n. s., v. 597; S. Z. F. J. i. 76.)

S. latifolia (broad-leaved). A synonym of *Holbœllia latifolia*.

STAURACANTHUS. Included under **Ulex** (which *see*).

STAURANTHERA (from *stauros*, a cross, and *anthera*, an anther; the anthers cohere in the form of a cross). SYNS. *Anomorhegmia*, *Cyananthus* (of Griffiths), *Miquelia*, *Quintilia*. ORD. *Gesneraceæ*. A small genus (two or three species) of stove herbs, inhabiting the East Indies and the Malayan Archipelago. Flowers blue, mediocre or rather large, loosely cymose or unilaterally racemose; calyx broadly campanulate and five-cleft; corolla somewhat rotate-campanulate, with a bilabiate limb, the posterior lip bifid; perfect stamens four. Leaves ample, membranous, solitary in the nodes or opposite and stipuliform. For culture of *S. grandifolia*, the only species introduced, *see* **Klugia.**

S. grandifolia (large-leaved). *fl.* 1in. long; calyx pubescent; corolla tube white, tinged with purple and pale yellow; limb pale purple; throat white, with a deep yellow spot on the lower side; peduncles terminating in many panicles. August. *l.* often 10in. long, 4in. broad, oblong, inequilateral; petioles stout, 2in. to 4in. long. Stems and branches succulent. *h.* 1ft. Moulmein, 1862. (B. M. 5409; F. M. 272.)

STAURITIS. *See* **Stauropsis.**

STAUROGLOTTIS. Included under *Phalænopsis*.

STAUROPSIS (from *stauros*, a cross, and *opsis*, appearance; so called from the shape of the flower). Erroneously printed *Stauritis*. SYN. *Fieldia* (of Gaudichaud). ORD. *Orchideæ*. A genus comprising about eight species of stove, epiphytal Orchids, natives of the Malayan Archipelago (and the East Indies?) Sepals and petals free, much-spreading; lip continuous with the column, spreading, concave, not spurred, narrow, the lateral lobes short, the middle one rather long; pollen masses two; raceme few or many-flowered; peduncles lateral. Leaves distichous, spreading, coriaceous, flat. Stem leafy, not pseudo-bulbous. For culture of the following species, *see* **Vanda.**

S. Batemanni (Bateman's).* *fl.* large and spreading; sepals and petals yellow, spotted with crimson in front, rosy-purple at back, fading to violet at the edge, thick and fleshy, falcate; lip purple-crimson, saccate at base, the front part furrowed and

Stauropsis—*continued.*

incurved, the disk bearing an elevated tooth, and its base a short transverse crest; scapes long, erect, many-flowered. July to September. *l.* lorate, obtuse, and obliquely emarginate at apex, light green. Stem stout. Philippine Islands. SYNS. *Fieldia lissochiloides*, *Vanda Batemanni* (B. R. 1846, 59), *V. lissochiloides*.

S. fasciata (banded). *fl.* large, few in a spike; sepals and petals white, with yellowish-cinnamon bars inside, cuneate-oblong, acute; lip whitish, the tips of the side plates of the anterior part yellow, and a few purplish spots on the keel of the under side; basilar laciniæ nearly dolabriform; peduncles stalked, trigonous. *l.* cuneate-ligulate, obtusely bilobed. Eastern tropical Asia, 1872. SYN. *Trichoglottis fasciata*.

S. gigantea (gigantic). *fl.* 3in. across; sepals and petals deep yellow, with cinnamon-brown blotches, oblong, obovate; lip white, fleshy, small, incurved, channelled, dolabriform, with short, rounded, basal auricles; racemes axillary, about half as long as the leaves. Spring. *l.* bold, distichous, dark green, broadly lorate, recurved, tough, 1½ft. long, very obtuse, emarginate. Burmah, 1858. A majestic plant. SYN. *Vanda gigantea* (B. M. 5189; I. H. 277; R. X. O. ii. 112).

STAUROSTIGMA (from *stauros*, a cross, and *stigma*, a stigma; in allusion to the cross or star-shaped stigmas). Including *Asterostigma* and *Rhopalostigma*. ORD. *Aroideæ* (*Araceæ*). A small genus (six species) of stove, tuberous, stoloniferous herbs, natives of tropical America. Flowers all perfect, the males and females contiguous; spathe erect, lanceolate, convolute at base, opening or gaping above; spadix monœcious, inappendiculate, cylindrical, shorter than the spathe; peduncles many or solitary, equalling the leaves. Leaves on long petioles, hastate-cordate, pinnatisect, or once or twice pinnatipartite; pinnæ sessile, acuminate. The introduced species are described below. A well-drained compost of sandy loam and peat is most suitable. A season of rest must be allowed, during which the plants should be sparingly watered, so as not to become quite dry. Propagation may be effected by seeds, sown in bottom heat; or by division of the tubers.

S. concinnum (neat). *fl.*, spathe narrow-lanceolate, very acute; spadix white and purple, scarcely shorter than the spathe, the male part dense-flowered; peduncle livid-purple, shorter than the petioles. *l.*, young ones reniform, pedatisect, the segments obovate-lanceolate; adults three-parted, the middle part pinnatisect, elongated-oblong, the lateral parts cymosely bi- or trisected; petioles nearly as long as the blades, marked with pale violet and dark purple. *h.* 1½ft. Brazil, 1860. (L. B. C. 1590, under name of *Caladium luridum*.)

S. c. colubrinum (snake-like). *fl.*, spathe greyish-green, marked with red and brownish-purple; spadix pale greenish and dirty-scarlet. Rio Janeiro, 1860.

S. c. Langsdorffii (Langsdorff's). *fl.*, spathe glaucous-green outside, livid or dirty-brown within; spadix rose-violet. *l.*, petioles green, more or less conspicuously spotted with white. *h.* 1½ft. Rio Janeiro, 1860.

S. c. lineolatum (lined). *fl.*, spathe greyish-green outside, with ochraceous stripes, brownish-purple within; spadix dirty-yellowish and rose-colour. *h.* 1½ft. Rio Janeiro, 1860.

S. Luschnathianum (Luschnath's). *fl.*, spathe deep green within and speckled with brown, reticulated externally, 2in. to 4in. long, erect, cylindric, acute; spadix cylindric; anthers scarlet; ovaries white; scape similar to the petiole. *l.* 1ft. to 2ft. long, deep green, pinnatifid, broadly ovate; two lower segments deflexed, deeply cut into three to five lobes; remaining segments four to six pairs, sessile, remote, irregularly sinuate-lobed or entire; petioles 6in. to 12in. long, whitish, with black-purple streaks. Rio Janeiro. (B. M. 5972, under name of *Asterostigma Luschnathianum*.)

S. Riedelianum (Riedel's). *fl.*, spathe yellowish, greenish outside; spadix slender, one-third shorter than the spathe; peduncles many, variegated. *l.*, adults three-parted; middle part pinnatisect, the segments linear-oblong, sessile, abruptly and rather long-cuspidate at apex; lower lateral ones shortly decurrent; peduncles spotted and variegated, scarcely longer than the blades. *h.* 2ft. Bahia, 1860.

STAVESACRE. *See* **Delphinium Staphysagria.**

STEAM, HEATING BY. A method of heating plant structures, which has been almost or entirely superseded by that of hot water. Most of the systems of heating now adopted in gardens, are described under **Heating** (which *see*).

STEEL-BLUE SIREX. *See* **Sirex.**

STEENHAMMERA. A synonym of **Mertensia** (which *see*).

STEGNOGRAMME. Included under *Polypodium*.

STEGOSIA. A synonym of **Rottboellia** (which *see*).

STELEPHUROS. A synonym of **Phleum** (which *see*).

STELIS (the old Greek name used by Theophrastus for some parasitical plant). ORD. *Orchideæ*. A large genus (about 150 species have been described) of stove, epiphytal orchids, inhabiting tropical America, from Brazil and Peru, as far as Mexico and the West Indies. Flowers small, sometimes minute, shortly pedicellate, in terminal, elongated racemes, rarely sub-distichous; sepals spreading, more or less connate; petals much shorter, broad, with thickened margins, often nearly including the column and lip; lip sessile at the base of the column, resembling the petals, or narrowed and occasionally three-lobed; pollen masses two; bracts alternate, often distichous. Leaves coriaceous, often contracted into the petioles. Stems tufted, or creeping with simple branches, one-leaved at apex, often with one to three sheaths below the leaves, not pseudo-bulbous. Few of the species have any attraction on the score of beauty; but many of them are very interesting. A selection of those best known to cultivators is given below. For culture, *see* **Pleurothallis.**

S. atropurpurea (dark purple). A synonym of *S. ciliaris*.

S. Bruckmülleri (Bruckmüller's).* *fl.* yellowish-purple outside, pale purple within, disposed at intervals of ¼in. along the rachis; sepals broadly ovate, acute, united at base, clothed with spreading hairs within; petals and lips very minute, the latter undivided; racemes two or three times as long as the leaves. December. *l.* 1½in. to 2in. long. Probably Mexican Andes. (B. M. 6521.)

S. canaliculata (channelled). *fl.* dull yellowish-green, very small, secund, disposed in a dense raceme; bracts and rachis whitish. *l.* cuneate-oblong, obtuse, thick, plainly channelled in the middle. *h.* 8in. Bogota, 1872.

S. ciliaris (ciliated).* *fl.* deep purple, with long fringes to the ovate sepals; petals oblate-rhomboid, fleshy; lip ovate, fleshy, channelled at base; spike naked half-way up, then closely covered with flowers. February. *l.* broadly oblong, narrowed at base. *h.* 6in. Mexico, 1842. SYN. *S. atropurpurea* (B. M. 3975).

S. Endresii (Endres'). *fl.* greenish-white; sepals coalescing towards the base; lip fleshy, transversely sub-rhomboid, excavated; raceme distichous. December and July. *l.* cuneate, oblong-ligulate, obtuse, emarginate and apiculate, thick. Costa Rica, 1870.

S. glossula (small-tongued). *fl.* brownish, standing in two transverse rows, the upper sepal having a much longer extent than the whole of the other organs of the flower together; lip fleshy, papuliform. *l.* cuneate, oblong-ligulate, minutely bilobed, with a small tooth at apex. Costa Rica, 1870. Plant densely tufted.

S. grandiflora (large-flowered). *fl.* chocolate-coloured, among the largest of the genus; sepals equal, obtuse; petals ovate; lip ovate, concave, emarginate; spike dense; spathe large, acuminate. July. *l.* oblong, petiolate, emarginate, 4½in. long, 1in. broad. Stem 3in. high. Brazil, 1836.

S. grossilabris (large-lipped). *fl.* light greenish, small; lip thick and fleshy; racemes shorter than the leaves. *l.* cuneate, spathulate, obtuse. Native place unknown. 1881. Plant tufted.

S. micrantha (small-flowered). *fl.* whitish, red within, nodding, one-sided-distichous; sepals deltoid; petals and lip truncate; raceme slender, spike-formed. April. *l.* lanceolate-oblong, rather blunt, contracted and tapering at base, 1in. to 2½in. long. *h.* 3in. to 6in. Jamaica, 1805. (H. E. F. 158; L. B. C. 1011; S. E. B. 75.)

S. ophioglossoides (Ophioglossum-like). *fl.* greenish, with a tinge of purple, minute; raceme slender, one-sided, pedunculate. September. *l.* 2½in. to 6in. long, oblong-linear, rather blunt, long-tapering at the base. Stem shorter than the leaves. West Indies, 1791. (B. R. 935; L. B. C. 442.)

S. sesquipedalis (foot-and-a-half). *fl.* pale yellow, secund, large; sepals roundish-ovate, obtuse; petals oblate; lip conformed, cucullate; spike 7in. to 10in. long. August. *l.* broadly oval, shortly petiolate, 1½in. to 4in. long. *h.* 6in. Sierra Nevada, 1845.

S. zonata (zoned). *fl.* light ochre; sepals brown at the base; petals with a mauve middle zone; raceme one-sided. *l.* very thick, cuneate-oblong, blunt. Stem short. Demerara, 1884.

STELLARIA (from *stella*, a star; alluding to the flowers). Starwort; Stitch Grass; Stitchwort. Including *Larbrea*, *Malachium*, *Micropetalon*, and *Spergularastrum*. ORD. *Caryophylleæ*. A genus comprising about seventy species of usually diffuse herbs, broadly dispersed over the globe, seven being natives of Britain. Flowers white, small, in dichotomous cymes; sepals and petals five, rarely four; stamens ten, rarely eight, five, or three. Leaves narrow or broad. *S. media* is the common Chickweed. *S. Holostea* is one of our early hedge-flowers. The species thrive in ordinary soil, but have little value as garden plants.

S. graminea aurea (golden grass-like). *fl.* white, many, ½in. to ¾in. in diameter; petals equalling the three-nerved sepals. May to August. *l.* very narrow, sessile, ciliate, pale golden-yellow. Stem 1ft. to 3ft. long, sub-erect, four-angled. (The green-leaved type is found in Europe (Britain), Siberia, Western Asia to the Himalayas.) A perennial, sometimes used in carpet-bedding.

FIG. 530. TOP OF PLANT OF STELLARIA HOLOSTEA.

S. Holostea (Holostea). Adder's Meat; Greater Stitchwort; Moon Flower; Satin Flower, &c. *fl.* white, ½in. to ¾in. in diameter, on slender pedicels; petals twice as long as the almost nerveless sepals. April to June. *l.* sessile, connate, lanceolate, 1in. to 4in. long, acuminate, rigid, ciliated. Stem 1ft. to 2ft. long, decumbent at base, brittle at the nodes, hairy above. Europe (Britain). Perennial. See Fig. 530. (Sy. En. B. 230.)

STELLATE. Star-shaped.

STELLERA (named in honour of G. W. Steller, 1709-1746, a celebrated Russian botanical collector). ORD. *Thymelæaceæ*. A small genus (eight species have been described, but not more than six are really distinct as such) of hardy, perennial herbs, sub-shrubs, or shrubs, natives of Central and Western Asia. Flowers hermaphrodite, sessile at the tips of the branches, capitate or densely spicate; perianth tube cylindrical, at length cut round above the ovary; lobes four, rarely five, spreading; stamens eight, rarely ten. Leaves alternate, flat. It is doubtful whether the under-mentioned species are still cultivated. Both are perennial herbs, thriving in ordinary soil; they may be multiplied by divisions.

S. altaica (Altaian). *fl.* white; lobes four; stamens eight; head ovoid, ten to fifteen-flowered, at length elongated into an oblong, leafless spike, about 1in. long. July. *l.* lanceolate or oblong, slightly acute, about 1in. long. Stems slender, many from the rhizome, erect or ascending. *h.* 1ft. Altai, 1824.

S. Chamæjasme (ground Jessamine). *fl.* white; lobes five; stamens ten; head six to fifteen-flowered. June. *l.* lanceolate or oblong, slightly acute, five to ten lines long. Stems often numerous from a thick rhizome, slender. *h.* 1ft. Siberia, 1817.

STEM. That part of a plant which supports the leaves and (in flowering plants) the flowers. It is always present in Vascular plants, though occasionally so extremely ill-developed that the plants are called *acaulescent* or stemless; but, in such plants, the top of the so-called root is, in truth, the stem. In the Algæ, Fungi, and Lichens there is no real distinction into Stems and leaves, the two being replaced by the thallus. In most plants, the Stem usually rises upwards towards light, contains chlorophyl, is covered with true epidermis, with stomata, and bears leaves and buds at the nodes—standing in marked contrast, in all these points, to roots, though exceptions occur to all of the characters mentioned. Stems vary from ½in. or less (*Centunculus minimus*) to 470ft. in height (*Eucalyptus amygdalina*), and from extreme slenderness (*e.g.*, in *Radiola millegrana*) to the enormous trunks of the Sequoias in Western America, whose girth is many yards.

It would occupy too much space to enter into details of the wide differences in habit met with in Stems, due to variation in thickness, branching (whether with or without a main stem), direction, and many other characters. A reference to the figures under such headings as **Agave, Cactus, Coreopsis, Fragaria, Hedera, Palmæ, Pinus,** &c., will give a better idea of these differences than any brief description could.

Internal structure of Stems also varies greatly; but there are two well-marked types in woody Stems, after the first year of growth. The one is characteristic of Dicotyledons and Conifers, and the other of Monocotyledons. In the former, there is the appearance, in cross-section, of as many rings of wood as the Stem is years old, due to the wood formed in autumn being closer in texture than that of spring, and therefore differing from it in appearance. There is also a well-marked bark, separated from the wood by a well-developed cambium, or layer, where growth in thickness is effected. In most Dicotyledons there is also pith in the centre of the Stem, and lines of cellular tissue, named medullary rays, run towards the circumference from the girth, and cut the wood into wedge-shaped masses. In the Monocotyledons, on the contrary, the Stems, in transverse section, show no appearance of layers, the bundles of woody fibres lying imbedded amongst cellular tissue, in which no separation into pith and bark is observable. In these Stems there are no annual rings, no medullary rays, no cambium, and no true bark; and the Stem, after it is once formed, does not increase in thickness, but only in length.

Certain forms of Stems have received special names, of which the following are among the more important: Caudex, applied to the columnar, erect Stems of Palms and Tree-ferns, marked with the bases of the leafstalks, or with their scars; Culm, the cylindrical, jointed Stems of Grasses and allied plants, which usually have hollow internodes; Scape, a leafless, erect stem, ending in a flower or group of flowers. Decumbent lateral stems, or branches, receive the following names: Runner, when slender, lying on the surface of the soil, and emitting roots at the nodes; Stolon, resembling a runner, but forming erect Stems from the terminal buds, which tend to form new plants; Offset, a short stolon; Sucker, an underground stolon.

Stems are occasionally much modified to serve peculiar functions. Among the most remarkable of such modifications are Spines and Tendrils. The former are branches or main Stems that have remained short, but

Stem—*continued.*

have the woody tissues largely developed, so that they are very strong and rigid, and, ending in sharp points, form an efficient protection against injury from animals. Examples of Stem-spines are seen in the Blackthorn, the Hawthorn, and many other shrubs. Tendrils, in a few plants (*e.g.*, Passion-flower and Vine), are very slender Stems that have the power of twining round firm supports in a continuous spiral from right to left, or from left to right. Twining Stems form a transition between tendrils and ordinary Stems.

STEMLET. A diminutive stem.

STEMMATIUM. A synonym of **Tristagma** (which *see*).

STEMODIA (from *stemon*, a stamen, and *dis*, double; alluding to the anthers, which consist of two separate cells). SYN. *Unanuea.* Including *Matourea.* ORD. *Scrophularineæ.* A genus comprising about twenty-six species of stove, greenhouse, or half-hardy, often aromatic herbs, sometimes sub-shrubs, inhabiting tropical and Southern extra-tropical America, tropical Africa and Asia, and Australia. Flowers generally bluish, solitary in the axils, or the upper ones clustered in leafy or bracted spikes; corolla tube cylindrical, the upper lip broad, entire or emarginate, the lower one spreading or three-lobed; stamens four, didynamous; anthers two-celled. Leaves opposite, or in whorls of three or four. Only two species call for description here. These thrive in any rich, moist soil, and may be readily multiplied by division of the roots.

S. chilensis (Chilian). *fl.*, corolla nearly twice as long as the calyx, the lower lip glabrous; spikes terminal, leafy, at length elongated and interrupted. September. *l.* oblong or lanceolate, 1in. to 2in. long, unequally serrated, acute, cordate-amplexicaul or auriculate at base. Stem above 1ft. high, branched above. Chili, 1829. Plant very viscous, half-hardy. (B. R. 1470.)

S. lobelioides (Lobelia-like). *fl.* of an intense blue; corolla nearly twice as long as the calyx, but smaller than in *S. chilensis*; spikes terminal, somewhat panicled, leafy, at length slightly elongated. August. *l.* oblong-lanceolate, acute, unequally serrated, narrowed towards the base, and often dilated-amplexicaul. *h.* 1ft. Brazil, 1830. Plant glabrous, half-hardy. (B. M. 3134, under name of *Gratiola tetragona.*)

STEMONA (from *stemon*, a stamen; in allusion to the foliaceous stamens). SYN. *Roxburghia.* ORD. *Roxburghiaceæ.* A small genus (four or five species) of interesting, stove climbers, natives of the East Indies, the Malayan Archipelago, and tropical Australia. Flowers rather large, handsome, but fœtid, on axillary, one or few-flowered peduncles; perianth segments four, distinct, biseriate, erect, acuminate; stamens nearly hypogynous. Leaves alternate, lanceolate, ovate, or cordate, rather shining, with thick, transverse veinlets; petioles inarticulate. Perhaps the only species in cultivation is that described below. It thrives in light, turfy loam, and may be readily increased by suckers.

S. gloriosoides (Gloriosa-like). *fl.* green, campanulate, glabrous; perianth segments narrow, acuminate; peduncles solitary, racemosely one to three-flowered. July. *l.* scattered, very rarely nearly opposite, ovate-lanceolate, loosely cordate, acuminate, slightly mucronate, 4in. to 6in. long. *h.* 6ft. East Indies, 1803. SYNS. *Roxburghia gloriosa* (B. M. 1500), *R. viridiflora* (S. E. B. 57).

STEMONACANTHUS. Included under *Ruellia.*

STENACTIS SPECIOSA. A synonym of **Erigeron speciosus** (which *see*).

STENANDRIUM IGNEUM. A synonym of *Chamæranthemum igneum.*

STENANTHERA (from *stenos*, narrow, and *anthera*, an anther; the filaments are broader than the anthers, which causes the latter to appear narrow). ORD. *Epacrideæ.* A small genus (two species) of beautiful, greenhouse, evergreen shrubs, now included, by Bentham, under *Astroloma*; both are natives of Australia. Flowers axillary, solitary; corolla tube without tufts of hairs or fringed scales inside; filaments much flattened. Leaves linear, with revolute margins. The species thrive best

Stenanthera—*continued.*

in a compost of one-third sandy loam, and two-thirds very sandy peat. The fine roots of the plants are injured by the application of much water; consequently, ample drainage must be provided in the pots. Propagation may be effected by cuttings, taken from the young shoots, and inserted in sand, under a glass, in heat.

S. ciliata (ciliated). *fl.* red, almost sessile; sepals obtuse; corolla tube nearly or quite ¾in. long; bracts very small. April. *l.* spreading, linear, tapering into a short point, serrulate-ciliated, convex, with recurved margins, crowded and ¼in. long, or more distant and ½in. long. Stems prostrate or diffuse. 1835. The correct name of this plant is *Astroloma longiflorum.*

S. pinifolia (Pine-leaved).* *fl.* sessile and solitary in each axil, but often crowded at the bases of the branchlets; bracts several, inner ones ⅓in. to ½in. long; corolla about ¾in. long, reddish at base, passing into yellow, with green tips. May. *l.* crowded, very narrow-linear, rigidly pointed, with revolute, scabrous margins, about ½in. long. *h.* 2ft. to 3ft. (or small and diffuse). 1811. (B. R. 218.)

STENANTHIUM (from *stenos*, narrow, and *anthos*, a blossom; alluding to the narrow perianth segments and panicles). ORD. *Liliaceæ.* This genus embraces five species of greenhouse or hardy, bulbous plants, of which one is a native of North-west Asia, and the rest are North American. Flowers racemose or paniculate, often nodding, pedicellate; perianth whitish, greenish, or dark purple, narrowly or broadly campanulate, the segments connate in a very short, turbinate tube, spreading above, narrow or lanceolate; stamens six; bracts small or minute. Leaves radical or at the base of the stem, long, linear or linear-lanceolate. Stem erect, tall, simple except the inflorescence, sometimes furnished with a few small leaves. Only three species call for mention here. They thrive in a mixture of sandy loam and peat, and may be increased by division. All are North American.

S. angustifolium (narrow-leaved). *fl.* greenish-white, the lower ones often sterile, nearly sessile; perianth about ¼in. in diameter; panicle 1ft. to 2ft. long, ⅓in. to ½in. broad, composed of simple, spiked racemes. June and July. *l.* channelled, 1ft. to 2ft. long. Stem 2ft. to 3ft. high. Hardy.

S. a. gramineum (Grass-like). *fl.* fewer than in the type. *l.* narrower. SYN. *Helonias graminea* (B. M. 1599).

S. frigidum (frigid). *fl.*, perianth purplish, ⅓in. to ⅔in. long; racemes lateral, ascending, few-flowered; panicle loose, 1ft. long. June. *l.*, radical ones five or six, firm, linear, acute, glabrous, 2ft. long. Stem 2ft. to 3ft. high, with a few reduced leaves. 1846. Hardy. (F. d. S. 468L; J. H. S. i. 32.)

S. occidentale (Western). *fl.* dark purple, somewhat resembling those of a Hyacinth, campanulate, disposed in a loose raceme. Summer. *l.* two to four, linear. Stem slender, furnished with a few reduced leaves. 1881. Hardy. (R. G. 1035, f. 3, and 1132, f. 1.)

STENIA (from *stenos*, narrow; alluding to the form of the pollen masses). ORD. *Orchideæ.* A small genus (three species) of stove, epiphytal orchids, natives of Guiana, Columbia, and Peru. Flowers rather large; sepals of equal length, spreading, the lateral ones rather broader, adnate at base to the foot of the rather thick, erect column; petals similar to the dorsal sepal; lip continuous with the foot of the column, fleshy, broad, nearly saccate, the lateral lobes small, the middle one undivided, or all broader and fimbriate, the disk crested; pollen masses four, oblong-linear; scapes short, recurved, one-flowered. Leaves oblong or narrow, coriaceous. Stems shortened. Pseudo-bulbs clustered, one or two-leaved. For culture, *see* **Maxillaria.**

S. fimbriata (fringed). *fl.* light yellow, membranous, marked at the base of the elegantly-fringed lip with brownish-purple dots; peduncles erect. *l.* cuneate-oblong, acute. Columbia, 1869. SYN. *Chondrorhynca fimbriata* (Ref. B. 107).

S. guttata (spotted). This species is closely related to *S. pallida*, but differs in having blunter sepals and petals, with spots of purple on a straw-coloured ground, and in the lip being blotched and having only seven callous teeth. Peru, 1880.

S. pallida (pale). *fl.* pale citron-colour, 1½in. or more in diameter; sepals and petals linear, acute; lip spotted with red, saccate, entire, fleshy, ovate; scapes radical, prostrate. August to October. *l.* two to five, oblong, acute, slightly narrowed and keeled at base, sheathed with brownish, spathaceous scales. Stem wanting. Demerara, 1837. (B. R. 1838, 30.)

STENOCARPUS (from *stenos*, narrow, and *karpos*, a fruit; alluding to the usually nearly flat follicles). SYNS. *Agnostus*, *Cybele*. ORD. *Proteaceæ*. A genus comprising fourteen species of stove or greenhouse trees, of which three are Australian and the rest New Caledonian. Flowers yellow, white, or red, umbellate, hermaphrodite, slightly irregular; perianth tube elongated, opening along the lower side; limb sub-globose, recurved, the segments at length separating; anthers sessile within the concave lamina; bracts small and highly caducous, or absent. Leaves alternate or scattered, entire or deeply pinnatifid with few lobes. Only three of the species have been introduced. For culture, *see* **Lomatia.**

S. Cunninghamii (Cunningham's). A synonym of *S. sinuatus.*

S. Forsteri (Forster's). *fl.* white; perianth four to five lines long; pedicels longer than the perianth; umbels solitary, six to eight-flowered; peduncles terminal, equalling the leaves. June. *l.* oblong, obtuse, attenuated and slightly petiolate, entire, ten to eighteen lines long, three to six lines broad, almost veinless. Branches terete; branchlets slender. *h.* 3ft. New Caledonia, 1850. (L. & P. F. G. ii. p. 166.)

S. salignus (Willow-like). Beef Wood. *fl.* greenish; perianth usually under ¼in. long; pedicels ¼in. to ½in. long, irregularly crowded; peduncles slender, terminal or in the upper axils, usually shorter than the leaves, bearing a single umbel of ten to thirty flowers. June. *l.* ovate-lanceolate or elliptic, acute, acuminate, or rarely obtuse, 2in. to 4in. long, tapering into short petioles. *h.* 5ft. or more. Australia, 1719. (B. R. 441.)

S. sinuatus (sinuate).* Fire-tree or Tulip-tree of Queensland. *fl.* bright red; perianth tube 1in. or more long, straight, tapering upwards; peduncles terminal, 2in. to 4in. long, each bearing an umbel of twelve to twenty flowers, and either generally umbellate or shortly racemose. June. *l.* petiolate, either undivided, oblong-lanceolate, and 6in. to 8in. long, or pinnatifid and above 1ft. long, with one to four oblong lobes on each side. *h.* (in Australia) 60ft. to 100ft. 1830. SYN. *S. Cunninghamii* (B. M. 4263; F. d. S. iii. 7; P. M. B. xiv. 1).

STENOCHILUS (from *stenos*, narrow, and *cheilos*, a lip; alluding to the narrow lip of the flower). ORD. *Myoporineæ*. A genus comprising eight species of pretty, little, greenhouse, evergreen, Australian shrubs, now included, by the authors of the "Genera Plantarum," under *Eremophila*. Calyx segments five, imbricated at base, usually enlarged after flowering; four upper lobes of corolla short and acute, the fifth lowest more deeply separated and sometimes narrow; stamens four (with one exception), exserted. Leaves alternate or scattered. The two best-known species are here described. They thrive in sandy peat, and may be increased by cuttings, inserted in sand, under a glass.

S. glaber (glabrous). *fl.* yellow, red, or with these colours variously mixed; corolla glabrous, or slightly pubescent outside, nearly or quite 1in. long, the tube constricted above the ovary; pedicels solitary. April. *l.* lanceolate, or rarely elliptic-oblong or cuneate, acute or obtuse, entire or slightly serrulated, usually ¾in. to 1in. long. *h.* 3ft. 1803. (B. M. 1942; B. R. 572.) SYNS. *S. incanus*, *S. viscosus* (B. M. 2930). The correct name of this plant is *Eremophila Brownii.*

S. incanus (hoary). A synonym of *S. glaber.*

S. maculatus (spotted). *fl.* red, more or less variegated with yellow, or quite yellow, solitary; corolla 1in. or more long, the lowest lobe separated to below the middle. April. *l.* mostly lanceolate, occasionally varying from elliptic-oblong to linear, acute or obtuse, entire, above 1in. long. *h.* 3ft. 1820. (B. R. 647.) The correct name of this plant is *Eremophila maculata.*

S. viscosus (clammy). A synonym of *S. glaber.*

STENOCHLÆNA. Included under *Acrostichum* and *Lomaria.*

STENOCORYNE (from *stenos*, narrow, and *koryne*, a club; alluding to the club-shaped spur of the lateral sepals). ORD. *Orchideæ*. A monotypic genus. The species is a stove, epiphytal Orchid, now regarded, by Bentham and Hooker, as a member of the genus *Bifrenaria.* For culture, *see* **Maxillaria.**

S. longicornis (long-horned). *fl.* orange, spotted with brown; lateral sepals ovate, acute, extended into a long, slender, clavate spur; lip long, unguiculate, three-lobed at apex; raceme loose, many-flowered. April. *l.* oblong-lanceolate, sub-plicate, shining. Pseudo-bulbs elongated, tetragonal. *h.* 1ft. Demerara, 1843.

STENOGASTRA. Included under **Sinningia** (which *see*).

STENOGLOSSUM (from *stenos*, narrow, and *glossa*, a tongue; alluding to the long, narrow labellum). ORD. *Orchideæ*. A monotypic genus. The species is a stove, epiphytal Orchid, having racemose flowers and narrow leaves, allied to *Epidendrum.* It is a native of the Andes of tropical America, and is not yet known to cultivation in this country.

STENOGLOTTIS (from *stenos*, narrow, and *glotta*, a tongue; alluding to the narrow lip). ORD. *Orchideæ*. A monotypic genus. The species is a greenhouse, terrestrial Orchid, allied to *Habenaria.* It thrives in a compost of loam and rotten leaves, with the addition of small pieces of decayed wood and charcoal. The temperature of an intermediate house is most suitable. Water must be plentifully supplied during the growing season. Propagation may be effected by division.

S. fimbriata (fringed). *fl.* rosy-pink, rather small, scattered on a slender spike, sub-secund; sepals free, sub-equal, at length spreading; petals similar, but smaller; lip spreading from the column, narrow, as long as the sepals, trifid at apex, not spurred; column very short. *l.* clustered at the base of the stem, oblong. Root tuberous, or consisting of fascicled, fleshy fibres. South Africa, 1871. (B. M. 5872.)

STENOLOMA. Included under **Davallia** (which *see*).

STENOMESSON (from *stenos*, narrow, and *messon*, middle; alluding to the shape of the perianth). Including *Callithauma*, *Chrysiphiala*, *Clitanthus*, *Coburgia*, *Neæra*, and *Sphærothele*. ORD. *Amaryllideæ*. This genus comprises, according to Mr. Baker, nineteen species of stove or greenhouse, bulbous plants, natives of tropical America. Flowers many in an umbel, very rarely reduced to one, often on pendulous, recurved pedicels; perianth red, orange, or fulvous, showy; tube elongated, sub-cylindrical, often slightly contracted above the base or towards the middle; lobes sub-equal, erect or more or less spreading; stamens erect, connected on a six-toothed corona; involucral bracts two, broad or narrow. Leaves appearing with the flowers, linear or rather broad, loriform. Except where otherwise indicated, the under-mentioned species require greenhouse heat. For culture, *see* **Hippeastrum.**

S. aurantiacum (orange). *fl.* nodding; perianth yellow, the segments ovate, erect; stamens included; bracts shorter than the pedicels; umbels two-flowered. May. *l.* ligulate, with revolute margins. *h.* 1ft. Quito, 1843. (B. R. 1844, 42, and R. H. 1883, p. 396, under name of *S. Hartwegii.*)

S. coccineum (scarlet).* *fl.* four to eight in an umbel, drooping; perianth bright crimson, 1½in. long, the oblong-lanceolate segments half as long as the tube; scape 1ft. or more high, firm, terete. May. *l.* four or five, 1ft. or more long, moderately fleshy. Peruvian Andes, 1850. (Ref. B. 309.) SYN. *Coburgia coccinea* (B. M. 3865).

S. croceum (yellow). *fl.* nearly erect, four in an umbel; perianth golden, 1½in. long, the tube curved, the limb segments connivent; bracts 1in. long, marcescent; scape 1ft. long, terete, glaucous. May. *l.* linear-lanceolate or oval-lanceolate, solitary, green above, whitish beneath. Peru, 1820. (B. M. 2641, under name of *S. flavum* B. R. 778, under name of *Chrysiphiala flava.*)

S. curvidentatum (curved-toothed). *fl.* shortly pedicellate; perianth golden, pale greenish below, 1½in. long, curved, the segments reflexed, obtuse; coronal teeth recurved; bracts ½in. long, marcescent; scape terete, 6in. long, two-flowered. May. *l.* lanceolate-oval, compressed, sub-acute. Peru, 1842. (B. M. 2640.)

S. Hartwegii (Hartweg's). A synonym of *S. aurantiacum.*

S. humilis (dwarf). *fl.*, perianth scarlet, nearly 3in. long, the tube cylindrical, enlarged above, the limb somewhat spreading; scape one-flowered. March. *l.* green, glabrous, shining, sub-acute, slightly channelled, nearly 1ft. long, and about ¼in. broad. Cordilleras, 1841. SYN. *Coburgia humilis* (B. R. 1842, 46).

S. incarnata (flesh-coloured).* *fl.* very shortly pedicellate; perianth variable in colour, usually red, nearly 5in. long, glabrous, the segments ovate-elliptic, slightly obtuse, spotted, nearly 1in long; scape four or five-flowered, erect, about 2ft. high. August *l.* linear, narrowed above, obtuse, entire, succulent, reticulate-nerved, glabrous, erect, 1½ft. long, 1in. broad. Quito, 1826. (R. G. 1147.) SYN. *Coburgia incarnata* (S. B. F. G. ser. ii. 17). The following so-called species are regarded, by Mr. Baker, as "apparently only, in a broad sense, varieties differing principally in the colour of the flower":

S. i. fulvum (fulvous). *fl.*, perianth tawny, 4½in. long; bracts persistent; scape above 2ft. long. *l.* about six, linear-ligulate,

Stenomesson—*continued.*

1½ft. or more long. SYN. *Coburgia fulva* (B. M. 3221; B. R. 1497).

S. i. trichromum (three-coloured). *fl.*, perianth tube scarlet, 4¾in. long, slightly curved; limb segments green above the middle, paler within. *l.* glaucous, obtuse, sub-erect. SYN. *Coburgia trichroma* (B. M. 3867 and 5686).

S. i. versicolor (various-coloured). *fl.*, perianth varying in colour from scarlet to whitish-fulvous, the lower part curved, 1in. long, the upper part ventricose, 1½in. long; limb 1in. long, the segments acute, spotted with green outside, whitish within. *l.* 2½ft. long, 2in. broad. SYN. *Coburgia versicolor* (B. R. xxviii. 66).

S. latifolium (broad-leaved). *fl.* shortly pedicellate, nearly erect; perianth orange-yellow, the tube cylindrical-infundibular, the segments spreading-recurved; scape umbellately five-flowered, green. March. *l.* petiolate, lanceolate-oblong, acuminate, narrowed into the petioles, striate-nerved. *h.* 1ft. Lima, 1837. Stove. (B. M. 3803.)

S. luteo-viride (yellowish-green). *fl.* five or six in an umbel, on very short pedicels; perianth tube greenish-yellow, cylindrical, 2in. to 3in. long, the segments yellow, with a distinct, green keel, 1in. long; corona green, ½in. long; scape 1½ft. long. Spring. *l.* about four, linear-lorate, glabrous, 1ft. long, 1in. broad, narrowed gradually to the point. Andes, 1878. (B. M. 6508.)

S. pauciflorum (few-flowered). *fl.* two to an umbel, one sessile, the other pedicellate, nearly erect; perianth yellow, nearly 2in. long, contracted above the middle, the segments green at back, concave, lanceolate, rigid; stamens exserted; scape glaucous. May. *l.* lanceolate, narrowed at both ends, petiolate. *h.* 1ft. Peru, 1822. SYN. *Chrysiphiala pauciflora* (H. E. F. 132).

S. Pearcei (Pearce's). *fl.* six to eight in an umbel; perianth greenish-yellow, cernuous, funnel-shaped, the segments primrose-yellow, tinged externally with green, oblong, erecto-patent; pedicels 2in. to 4in. long; scape 2½ft. to 3ft. high, firm, slightly compressed. May. *l.* lorate-lanceolate, 1½ft. long, narrowed gradually upwards to an acute point, and downwards into a flattened petiole 2in. to 3in. long, the edges rather revolute Andes of Bolivia, 1872. (Ref. B. 308.)

S. Stricklandi (Strickland's). *fl.* five or six in an umbel; perianth bright red, the segments longer than the tube. Spring. *l.* petiolate, oblong-lanceolate. Andes of Ecuador, 1882.

S. suspensum (suspended). *fl.* four to six, drooping, on pedicels about 1in. long; perianth bright scarlet, 1½in. long, the tube half its length, the divisions ½in. deep; spathe two-leaved, 1½in. long; scape firm, erect, naked, 1ft. high. May. *l.* two, linear, acute, 1ft. long, ½in. broad, fleshy. Peru, 1865. (Ref. B. 22.)

S. viridiflorum (green-flowered). *fl.*, perianth green, very pretty; peduncle short; bracts marcescent, deciduous; scape erect, 6ft. high, terete, smooth. May. *l.* long, flat, ensiform, about ¾in. broad, erecto-patent, diverging. Peru, 1839. SYN. *Callithauma viridiflorum* (B. M. 3866).

S. vitellinum (yolk-of-egg-coloured).* *fl.* on short pedicels, six in an umbel; perianth yellow, with erect segments; stamens exserted; scape 7in. long, glaucous. April. *l.* obovate-oblong, three-nerved, petiolate, recurved at the margins, glaucous beneath. *h.* 1ft. Lima, 1842. Stove. (B. R. 1843, 2.)

STENOPTERA (from *stenos*, narrow, and *pteron*, a wing; alluding to the linear, contracted inner segments of the perianth). SYN. *Porphyrostachys.* ORD. *Orchideæ.* A small genus (three species) of stove, terrestrial orchids, natives of the mountains of tropical America. Flowers showy or mediocre, in a dense or slender spike. Leaves clustered at the base of the stem. The species are unknown to cultivation.

STENORHYNCHUS. Included under **Spiranthes** (which *see*).

STENOS. This term, used in Greek compounds, signifies narrow; *e.g.*, Stenophyllum, narrow-leaved.

STENOSEMIA. Included under **Acrostichum** (which *see*).

STENOSOLENIUM. A synonym of *Arnebia.*

STENOSPERMATION (from *stenos*, narrow, and *spermation*, a diminutive of *sperma*, a seed; in allusion to the slender seeds). ORD. *Aroideæ* (*Araceæ*). A genus consisting of about seven species of stove herbs or sub-shrubs, natives of tropical America. Flowers all hermaphrodite; spathe navicular, convolute, at length opening, wholly deciduous; spadix long-stipitate, inappendiculate, much shorter than the spathe, cylindrical; peduncle terminal, straight. Leaves distichous, coriaceous, lanceolate, acuminate; petioles short or elongated, sometimes sheathing along their whole length. Caudex elongated, creeping, or rooting at the nodes. *S. pompayanense*, the only species introduced, requires culture similar to **Spathiphyllum** (which *see*).

Stenospermation—*continued.*

S. pompayanense (Pompayan). *fl.*, spathe ivory-white, boat-shaped, long-cuspidate; spadix suffused with white, about 2in. long. *l.* elliptic-oblong or oblong-lanceolate, slightly obtuse at base; petioles half to three-quarters the length of the blades, sheathed above the middle. Caudex ascending. *h.* 1ft. Pompayan Andes, 1875. Evergreen perennial. SYNS. *S. Wallisii* (B. M. 6334 and G. C. 1875, 116-7), *Spathiphyllum Wallisii.*

S. Wallisii (Wallis'). A synonym of *S. pompayanense.*

STENOSTEMUM. A synonym of **Stenostomum** (which *see*).

STENOSTOMUM (from *stenos*, narrow, and *stoma*, a mouth; alluding to the shape of the flowers). SYNS. *Stenostemum, Sturmia.* ORD. *Rubiaceæ.* A small genus (about five species) of pretty, small, stove, evergreen trees, natives of the West Indies, now included, by Bentham and Hooker, as a section of the genus *Antirrhœa.* Flowers white, small, cymose; calyx five-toothed; corolla funnel-shaped, five-lobed; stamens five; peduncles axillary. Leaves opposite, oval or oblong, shortly petiolate; stipules at length deciduous. For culture of the two species introduced, *see* **Hamiltonia.**

S. lucidum (clear). *fl.* distant; peduncles once or twice bifid below or at the middle. May. *l.* elliptic or elliptic-oblong, chartaceous, 2in. to 3in. long, blunt, shining-glabrous. 1818. A small tree.

S. tomentosum (tomentose). *fl.* distant; peduncles rather exceeding the leaves, once or twice bifid about the middle. May. *l.* elliptic, 3in. to 4in. long, glabrous above, velvety-tomentose beneath. 1822. A small tree.

STENOTAPHRUM (from *stenos*, narrow, and *taphros*, a trench; referring to the cavities in the rachis in which the spikelets are seated). SYN. *Diastemanthe.* ORD. *Gramineæ.* A small genus (two or three species) of stove, creeping, radicant grasses, inhabiting tropical regions, mostly near the sea. Spikelets usually two or four together in very short spikes, embedded in the alternate notches of the broad rachis of a spike-like panicle, the rachis of the partial spike usually produced into a short point beyond the insertion of the spikelets, and the common rachis often disarticulating transversely between the notches when old; glumes four; inflorescence terminal. Leaves flat or convolute, spreading. *S. americanum*, the only species in cultivation, is a curious, perennial grass, thriving in a light, loamy soil. It may be increased by seeds, or by divisions.

S. americanum (American). Australian Buffalo Grass. *fl.*, spikes solitary and terminal, 2in. or more long, the rachis flat and flexuous, readily disarticulating transversely between the notches when old. *l.* obtuse, flat or involute, the sheaths usually broad and flat, ciliated at the orifice. Stems somewhat flattened. *h.* about 1ft. Tropical regions, &c. SYN. *S. glabrum.*

S. a. variegatum (variegated).* *l.* 2in. to 4in. long, blunt, freely striped with creamy-white. 1874. An excellent basket plant. This is probably the plant catalogued by some nurserymen as *Stephanophorum glabrum variegatum.*

S. glabrum (glabrous). A synonym of *S. americanum.*

STEPHANANDRA (from *stephanos*, a crown, and *aner, andros*, a male; alluding to the disposition of the stamens). ORD. *Rosaceæ.* A monotypic genus. The species is a hardy, deciduous shrub, allied to **Spiræa** (which *see* for culture).

S. flexuosa (flexuous). *fl.* white, small, disposed in corymbose panicles or racemes, slenderly pedicellate, ebracteolate; calyx lobes and petals five, the latter spathulate. July. *l.* alternate, petiolate, incised, or pinnatifid and incised-serrate, pubescent beneath; stipules leafy, persistent. Branches slender, distichous, flexuous. Japan, 1870.

STEPHANIA (named in honour of Professor Frederick Stephan, of Moscow, who died in 1817). SYN. *Clypea.* ORD. *Menispermaceæ.* A small genus (three species) of stove or greenhouse climbers, natives of tropical Africa or Asia, or tropical and sub-tropical Australia. Flowers dicœcious, disposed in simple or compound umbels; males with six to ten, females with three to five, sepals. Leaves usually peltate. The species introduced require similar treatment to **Morisonia** (which *see*).

Stephania—*continued.*

S. hernandifolia (Hernandia-leaved). *fl.* in capitate umbels, on short or long, axillary peduncles; petals three or four; rays eight to twelve, with subulate bracts. June. *l.* ovate or sub-deltoid, acute, obtuse, or acuminate at apex, truncate or sub-cordate at base, 3in. to 6in. in diameter, glabrous or thinly pubescent below or on both surfaces; petioles 1½in. to 4in. long. India.

S. rotunda (round-leaved). *fl.* orange; umbels loosely cymose. June. *l.* broadly ovate or nearly round, irregularly sinuate-lobed or repand, glabrous, on long petioles. Himalayas, 1866. Greenhouse.

STEPHANIA (of Willdenow). A synonym of **Steriphoma** (which *see*).

STEPHANIUM. A synonym of **Palicourea** (which *see*).

STEPHANOCOMA (from *stephanos*, a crown, and *kome*, hair; referring to the crown-like pappus). ORD. *Compositæ*. A monotypic genus. The species is a greenhouse, Thistle-like herb, requiring culture similar to **Berkheya** (which *see*).

S. carduoides (Thistle-like). *fl.-heads* yellow, discoid, small, at the tips of the branches, corymbose; involucral scales shorter than the disk, in many rows, subulate, margined with solitary, slender spines. Autumn. *l.* sparsely setulose, or glabrous on both sides, spiny-toothed or lobed, long-decurrent. Stem erect, striate, sub-glabrous. *h.* 2½ft. South Africa, 1864. (B. M. 5715, under name of *Stobæa sphærocephala*.)

STEPHANOLIRION. A synonym of **Tristagma** (which *see*).

STEPHANOMERIA (from *stephanos*, a crown, and *meris*, a part; a name of no particular application). SYN. *Jamesia* (of Nees). ORD. *Compositæ*. A genus comprising about eight species of hardy, glabrous, annual or perennial herbs, natives of North-west America. Flower-heads pink and white, radiate, sometimes terminal and erect, sometimes fascicled at the sides of the branches; ray florets ligulate, truncately five-toothed at apex. Leaves alternate, narrow, entire, remotely toothed, runcinate-pinnatifid, or the cauline ones reduced to short scales. Stems erect, simple or divaricately branched. Probably none of the species are now grown in this country.

STEPHANOPHORUM GLABRUM VARIEGATUM. *See* **Stenotaphrum americanum variegatum.**

STEPHANOPHYSUM. Included under **Ruellia** (which *see*).

STEPHANOTIS (from *stephanos*, a crown, and *ous, otos*, an ear; alluding to the auricles of the staminal crown). SYN. *Jasminanthes*. ORD. *Asclepiadeæ*. A genus comprising about fourteen species of glabrous, twining, often tall-climbing, stove shrubs; five are found in Madagascar, five in the Malayan Archipelago and South China, three in Cuba, and one in Peru. Flowers white, large, simple, in umbelliform cymes; calyx five-parted, the segments somewhat leafy; corolla salver-shaped or nearly funnel-shaped, the tube cylindrical, broader at the base, and dilated at the throat, the limb of five twisted lobes; coronal scales five, erect, often free at apex. Leaves opposite, coriaceous. Only two of the species have been introduced. *S. floribunda* is a beautiful and very popular, stove plant, because of its fragrant, pure white blossoms, which are produced in great profusion. It succeeds best in turfy loam, and may be increased by cuttings of the previous year's growth, inserted singly in pots, in spring, and placed in a close frame with a temperature of 60deg. Established plants do best when placed in a bed of prepared soil, about 3ft. square, and the growths trained to a trellis beneath the roof. *S. Thouarsii* thrives under similar treatment.

Stephanotis—*continued.*

S. floribunda (bundle-flowered).* Clustered Wax Flower; Madagascar Chaplet Flower; Madagascar Jasmine. *fl.* of the purest white, highly fragrant, borne freely in large bunches; sepals ovate, obtuse, one-fourth as long as the corolla tube; segments of the corolla ovate-oblong; coronal scales ovate, shorter than the anthers; peduncles short, scarcely equalling the petioles. May. *l.* oval or ovate-elliptic, ample, of great substance, retuse or very shortly uncinate-acuminate. *h.* 10ft. Madagascar, 1839. See Fig. 531. (B. v. 203; B. M. 4058; G. C. n. s., xiv. p. 169; P. M. B. xi. 29.) The Elvaston variety is a compact-growing, floriferous form (G. C. n. s., xiv., p. 169.)

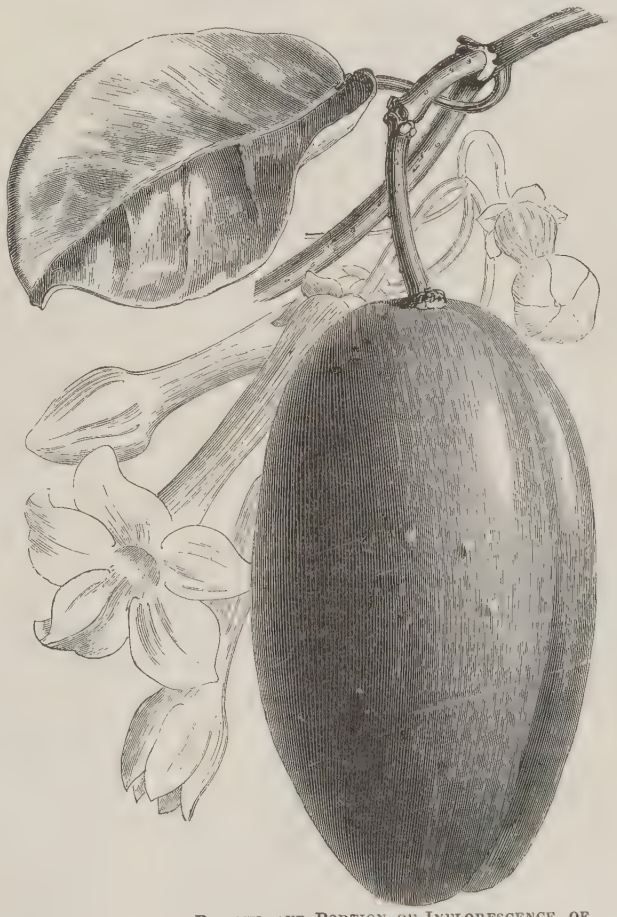


FIG. 531. FRUITING BRANCH, AND PORTION OF INFLORESCENCE, OF STEPHANOTIS FLORIBUNDA.

S. Thouarsii (Thouars'). *fl.*, sepals ovate-lanceolate, one-third the length of the corolla tube; coronal scales lanceolate, exceeding the anthers; peduncles equalling the petioles, three-flowered. May. *l.* obovate or obovate-oblong, shortly acuminate. *h.* 10ft. Madagascar, 1842.

STEPS. In gardens, these are best constructed of stone, which should be of a description suitable for withstanding frost and exposure to all weathers. Steps are necessary for affording a means of entering glass houses, when the latter are situated above the ground level, and for passing from one terrace walk to another, when the ground is too steep or inconveniently situated for forming a slope instead.

Folding Steps, made of wood, and hinged at the top,

Steps—*continued.*

are very valuable for standing upon in places where a ladder cannot be used. Two pairs of folding Steps, with a plank resting on their tops, make a good movable stage for the use of workmen engaged in clipping high hedges, &c.

STERCULIA (from Sterculius, a god, derived from *stercus*, dung; the flowers and leaves of some of the species are fœtid). Including *Brachychiton* (kept distinct in this work), *Delabechea*, *Ivira*, and *Southwellia*. ORD. *Sterculiaceæ*. Of this genus, about sixty species have been described as such, but probably not more than fifty are really distinct; they are stove or greenhouse, evergreen trees, inhabiting the warmer regions of the globe, being most plentiful in tropical Asia. Flowers paniculate or rarely racemose, the inflorescence usually axillary; calyx five-cleft or five-parted, rarely four-parted, often coloured; petals wanting; staminal column bearing at the summit fifteen (or rarely ten) stamens. Leaves undivided, lobed, or digitate. The species introduced, a selection of which is given below, succeed in a light, loamy soil, or a compost of loam and peat. Ripened cuttings, with the leaves intact, will readily root in sand, under a hand-glass; those of the stove species require a moist heat.

S. Balanghas (Balanghas). *fl.* purplish, panicled; calyx segments linear, five-cleft to the middle, the segments connivent. June to September. *l.* elliptic-oblong, rather blunt, entire, nearly smooth. *h.* 30ft. Malabar and East Indies, 1787. Stove.

S. Bidwilli (Bidwill's). The correct name of plant described in this work as *Brachychiton Bidwilli*.

S. discolor (discoloured).* *fl.* in terminal, contracted, spicate panicles; calyx rose-red, rusty-tomentose, 1½in. long, between campanulate and funnel-shaped. *l.* long-petiolate, 5in. to 7in. long and broad, pale green, cordate or bilobed at base, with a broad or narrow sinus, more or less deeply five-lobed, but never beyond the middle. *h.* 40ft. West Australia, 1882. Greenhouse. (B. M. 6608.)

S. diversifolia (variable-leaved). Bottle-tree of Victoria. The correct name of plant described in this work as *Brachychiton diversifolium*.

S. Ivira (Ivira). *fl.* yellowish, with spreading segments, in panicles; carpels bristly. July. *l.* ovate, smooth, acuminated at the apex, entire, rarely three-lobed. *h.* 20ft. to 60ft. South America, 1793. Stove.

S. lanceolata (lanceolate-leaved). *fl.* reddish-brown, stellate, in small, axillary panicles; calyx segments spreading, not cohering at base; racemes simple. Summer. *l.* quite entire, smooth, ovate-lanceolate. *h.* 20ft. China. Greenhouse. (B. R. 1256.)

S. macrophylla (large-leaved). *fl.* yellow; calyx five-cleft, with spreading segments; panicles lateral, drooping. July. *l.* deeply cordate, obtuse, undivided, tomentose beneath. East Indies, 1822. A large, stove tree.

S. platanifolia (Plane-leaved). Chinese Parasol. *fl.* panicled. *l.* large, highly glabrous, cordate, three to five-lobed; lobes

FIG. 532. FRUITS AND LEAF OF STERCULIA RUPESTRIS.

Sterculia—*continued.*

terminating in an acute point, the sinuses rounded: petioles terete. China. A tall, greenhouse tree.

S. pubescens (downy). A synonym of *S. tragacanthæ*.

FIG. 533. DEHISCING FRUIT AND SEED OF STERCULIA RUPESTRIS.

S. rupestris (rock-loving). Bottle-tree. *fl.*, calyx campanulate, deeply lobed; panicle tomentose, usually longer than the petioles. Summer. *l.* glabrous, either quite entire, oblong-linear or lanceolate, 3in. to 6in. long, or digitate, of five to nine sessile leaflets, often above 6in. long. Australia, 1880. A good-sized, greenhouse tree, the trunk often swelling to a large size—hence the common name. See Figs. 532 and 533. SYN. *Delabechea rupestris*.

S. tragacanthæ (tragacanth). Tragacanth Gum-tree of Sierra Leone. *fl.* red-brown; calyx segments equalling the turbinate tube; panicle axillary, coarctate, tomentose. Summer. *l.* ovate, acute, obtuse at base, tomentose beneath. *h.* 20ft. Guinea, 1793. Stove. (B. R. 1363.) SYN. *S. pubescens*.

S. villosa (villous). *fl.*, calyx downy outside, pinkish within; style recurved; panicle compound, pendulous. June. *l.* five to seven-lobed, acuminate, velvety-tomentose beneath. *h.* 15ft. East Indies, 1805. Stove.

STERCULIACEÆ. A natural order of usually soft-wooded herbs, shrubs, or trees, mostly inhabiting tropical and sub-tropical regions. Flowers regular, hermaphrodite or unisexual; calyx gamosepalous, usually persistent, more or less deeply five-cleft, rarely four or three-cleft, the lobes valvate; petals five, hypogynous, free or adnate at base with the staminal tube, often marcescent-persistent, twisted-imbricated, or wanting; stamens very variable; inflorescence axillary or rarely terminal, racemose or cymose-paniculate, or rarely reduced to a solitary flower. Fruit dry or rarely baccate. Leaves alternate, or very rarely nearly opposite, sometimes simple, penni-nerved or palminerved, entire, toothed, or lobed, sometimes digitately three to nine-foliolate; stipules at the bases of the petioles, very rarely wanting. *Sterculiaceæ* contain an abundant mucilage, combined, in the old bark of the woody species, with a bitter, astringent matter, and are emetics and stimulants. The dried and split cotyledons of the seeds of *Theobroma Cacao* are called cocoa nibs, and, when ground and made into a paste, chocolate. The seeds comprise, among other properties, a fixed and solid oil, known as cocoa butter. The order embraces about forty-six genera, and 520 species. These are classified, by the authors of the "Genera Plantarum," under seven tribes: *Buettnerieæ*, *Dombeyeæ*, *Eriolæneæ*, *Helictereæ*, *Hermannieæ*, *Lasiopetaleæ*, and *Sterculieæ*. Illustrative genera are: *Buettneria*, *Cola*, *Commersonia*, *Helicteres*, *Lasiopetalum*, *Sterculia*.

STEREOSANDRA (from *stereos*, rigid, and *aner*, *andros*, a male or anther; in reference to the upright stamen). ORD. *Orchideæ*. A monotypic genus. The species is a stove, terrestrial, leafless orchid, bearing a loose raceme of shortly-pedicellate, medium-sized flowers. It is a native of Java, and has not been introduced to cultivation in this country.

STEREOXYLON. A synonym of *Escallonia*.

STERIGMA (from *sterigma*, a fork; the larger stamens are connected at the base and forked at the top). Syn. *Sterigmostemon*. Ord. *Cruciferæ*. A genus comprising five species of hardy, robust, perennial herbs, natives of Asia Minor, Persia, the Caspian region, and Siberia. Flowers yellow, rather large, in elongated, ebracteate racemes; sepals sub-erect; pedicels rather thick, spreading. Leaves entire or pinnatifid. One or two of the species have been introduced, but they are now probably lost to cultivation.

STERIGMA. A term applied to any foliaceous prolongation of the blade of a leaf down on the stem by decurrence.

STERIGMOSTEMON. A synonym of **Sterigma** (which *see*).

STERILE. Barren. A male or staminate flower is commonly said to be Sterile.

STERIPHOMA (from *steriphoma*, a foundation; in allusion to the large fruit-stalk). Syns. *Rœmeria* (of Trattinick), *Stephania* (of Willdenow). Ord. *Capparideæ*. A small genus (three species) of stove, unarmed shrubs, natives of Peru, New Grenada, Venezuela, and the Trinity Islands. Flowers orange, showy; calyx two or four-lobed at apex, irregularly ruptured; torus very short; petals four, sessile; stamens six; racemes terminal; peduncles thick; pedicels thickened at the apex, infracted or recurved, one-flowered. Leaves long-petiolate, one-foliolate; leaflet lanceolate, entire; petiole thickened at the apex. The only species introduced is well worth cultivating on account of the beauty of its flowers. It thrives in a compost of equal parts loam, peat, and sand. Cuttings should be taken from young wood, inserted in a pot of sand, and plunged in heat, under a hand glass.

S. cleomoides (Cleome-like).* *fl.* with a reddish-brown calyx and yellow petals and stamens. April to July. *l.* oblong-lanceolate, much acuminated, scarcely longer than the footstalks. *h.* 6ft. Caraccas, 1823. Syn. *S. paradoxum* (B. M. 5788; F. d. S. 564-5; L. & P. F. G. i. 73, p. 107.)

S. paradoxum (paradoxical). A synonym of *S. cleomoides*.

STERIS. Now included under **Hydrolea** (which *see*).

STERNBERGIA (named in honour of Count Caspar Sternberg, 1761-1838, a celebrated botanist). Mount Etna Lily. Including *Oporanthus*. Ord. *Amaryllideæ*. Of this genus, about twelve species have been described, but, according to Mr. Baker, not more than four are distinct as such; they are hardy, bulbous plants, inhabiting Eastern Europe and the Mediterranean region. Flower often solitary; perianth funnel-shaped, straight, with a short or rather long tube, and linear or lanceolate, equal, erecto-patent lobes; stamens equally affixed at the throat or the bases of the lobes; bracts membranous, hyaline, tubular at base; scape short, sometimes very short, solid. Leaves late or cotemporary with the flowers. Bulb tunicated. *S. lutea* is a popular and valuable plant, on account of its yellow flowers being produced in autumn. The genus may be divided into two sections, viz., *Sternbergia* proper, having autumnal flowers, with a cylindrical tube, and leaves produced in spring; and *Oporanthus*, with short-tubed, funnel-shaped flowers, produced, with the leaves, in October. To the first section belong *S. colchiciflora*, *S. macrantha*, and *S. Schubertii*. *S. lutea* and its forms comprise the second section. Only a couple of species call for mention here. They succeed best in soil of a good depth, and in a sheltered position. The bulbs may be placed from 4in. to 6in. below the surface when planting.

S. colchiciflora (Colchicum-flowered). *fl.* sessile, erect, odorous; perianth tube yellowish-white, straight, partly subterraneous, five to nine lines long; limb yellow, erecto-patent, 1in. to 1¼in. long, the segments striate-nerved; scape subterraneous, one-flowered. Autumn. *l.* produced in spring, rarely in autumn, usually five,

Sternbergia—*continued.*

erect, twisted, carinate, obtusely callous, 4in. long, one line or more broad. Hungary and Roumelia, 1816. (B. R. 2008.)

S. lutea (yellow).* Winter Daffodil; Yellow Star Flower. *fl.*, perianth yellow, 1⅝in. to 2½in. long, turbinate-campanulate; tube straight, funnel-shaped; segments slightly concave, obtuse or emarginate, twelve to seventeen lines long; scape 2in. to 4in. long. Autumn. *l.* five, six, or more, arcuate-reflexed, linear-lorate, obtusely carinate, canaliculate, obtuse, dark green, 6in. to 12in. long, four to six lines broad. Central Europe, 1596. See

Fig. 534. Sternbergia lutea.

Fig. 534. Syn. *Amaryllis lutea* (B. M. 290; S. F. G. 310). This plant is supposed to be the "Lily of the Field," of Scripture. The following, often classified as species, are regarded, by Mr. Baker as mere varieties:

S. l. exigua (mean). *fl.* erect; perianth tube campanulate, with equal segments; scape 1in. long. *l.* one to three, short. North Africa, 1820.

S. l. Fischeriana (Fischer's). *fl.* pale yellow; perianth scarcely 1⅝in. long; scape 9in. long, mostly underground. Spring. *l.* erect, loriform, quite flat. Karabagh, 1868. (R. G. 576, under name of *S. Fischeriana*.)

S. l. græca (Grecian). A form with short peduncle, leaves short at flowering period, finally 4in. to 5in. long by ⅛in. broad. Greece.

S. l. sicula (Sicilian).* A variety bearing larger flowers, with more acute, narrower perianth segments. Sicily.

STEUDELIA (of Sprengel). A synonym of *Erythroxylon*.

STEUDNERA (named after Dr. Steudner, of Gorlitz, a German botanist). Ord. *Aroideæ* (*Araceæ*). A small genus (three or four species) of stove, herbaceous perennials, natives of Burmah. Flowers all perfect, dense, the females much shorter than the males; spathe opening,

Steudnera—*continued.*

very shortly convolute at base, ovate-lanceolate, at length reflexed above the middle, marcescent; spadix much shorter than the spathe, part of the back female flowers adnate; peduncle short. Leaves long-petiolate, peltate, ovate-oblong, emarginate at base. Caudex thick, elongated, ascending, membranous-sheathed. *S. colocasiæfolia* and its variety are the only members of this genus yet introduced. These thrive in a soil composed of rich, sandy loam, leaf mould, and bits of broken charcoal, well mixed and drained. A moist atmosphere is desirable, and a resting period necessary. Propagation may be effected by suckers, by cuttings, or by division of the rootstock.

S. colocasiæfolia (Colocasia-leaved). *fl.*, spathe yellowish, more or less dark purple within, becoming recurved so as to expose the spadix, which is whitish, one-third as long as the spathe, and erect. *l.* of an obscure green above, paler beneath; petioles sometimes of a somewhat violet colour. Stems short, thick, fleshy. 1869. (I. H. n. s. 90; R. G. 633.)

S. c. discolor (two-coloured). *fl.*, spathe yellow on both surfaces, the base reddish-purple. *l.* marked between the primary veins above with a series of broad, brownish-purple blotches. *h.* 1ft. 1874. (B. M. 6076 and F. d. S. 2201, under name of *S. colocasiæfolia.*)

STEVENIA. Included under *Arabis.*

STEVENSONIA (named after Stevenson, formerly Governor of the Island of Mauritius and its dependencies). SYN. *Phœnicophorium.* ORD. *Palmæ.* A monotypic genus. The species is a noble, stove Palm. It thrives in a hot, moisture-laden atmosphere, and suffers if the temperature falls too low, or the air becomes dry. The mixture best adapted for it is a well-drained, fibrous peat, with pieces of charcoal and turfy loam and sand intermixed. Propagated by means of imported seeds.

S. grandifolia (large-leaved).* *fl.*, lower spathes 1½ft. long, the upper ones club-shaped, smooth, 2ft. to 3½ft. long; spadix 3ft. to 6ft. long; peduncle 1½ft. to 3ft. long, compressed at base. *fr.* orange-red, ⅓in. to ⅝in. long. *l.* cuneate-obovate, bifid, oblique at base, deeply laciniated down the side, with incised segments; petioles 9in. to 18in. long, glabrous, pale green, convex below; sheaths 2ft. to 3ft. long, hoary, scaly, and spiny. Stem very spiny when young, less so when old. *h.* 40ft. Seychelles, 1865. SYNS. *Areca sechellarum, Astrocaryum Borsigyanum* and *A. pictum* (all of gardens), *Phœnicophorium sechellarum* (I. H. 433).

STEVIA (named after Peter James Esteve, M.D., Professor of Botany at Valencia, in the sixteenth century). ORD. *Compositæ.* A genus of stove, greenhouse, or hardy herbs or sub-shrubs, rarely diffuse. More than 100 species have been described by various authors, but the number may be reduced; they inhabit the warmer parts of America. Flower-heads white or purplish, paniculate or corymbose; involucre cylindrical; bracts five or six; receptacle flat, naked; florets five, equal, regular, five-cleft, tubular; achenes narrow; pappus paleæ or bristles two or many. Leaves opposite, or the upper ones alternate, often triple-nerved and serrated, sometimes trisected or entire. The under-mentioned species are rather pretty, perennial herbs, and, except where otherwise stated, all succeed in the open flower-border, in summer. The protection of a frame is necessary in severe weather. Propagation may be effected by seeds, by cuttings, or by divisions.

S. breviaristata (short-awned). *fl.-heads* of a beautiful rose-colour, disposed in a dense corymb; florets with a long tube and a limb of five spreading segments; pappus of three rather strong, rigid crowns, short. July. *l.* opposite, nearly glabrous, coarsely serrated, attenuated, but not petiolate; upper ones lanceolate. Branches downy. *h.* 2ft. to 3ft. Tucuman, 1836. Stove. (B. M. 3792.)

S. Eupatoria (Hemp Agrimony-like). *fl.-heads* in fastigiate, rather loose corymbs; florets white, flesh-coloured in the tube, twice as long as the involucre. August. *l.* lanceolate, somewhat attenuated into the petioles, three-nerved, the upper ones obsoletely serrated. *h.* 1½ft. Mexico, 1826. (B. M. 1849.) SYN. *S. punctata.*

S. fascicularis (fascicled). A synonym of *S. rhombifolia.*

S. hyssopifolia (Hyssop-leaved). A synonym of *S. paniculata.*

S. ivæfolia (Iva-leaved). A synonym of *S. serrata.*

S. ovata (ovate-leaved). *fl.-heads* white, in rather compact, fastigiate corymbs. August. *l.* ovate, serrated, cuneate at base,

Stevia—*continued.*

entire; upper ones oblong, sub-entire. Stem erect, paniculate. *h.* 2ft. Mexico, 1816.

S. paniculata (paniculate). *fl.-heads* white, the tubes of the ray florets, which are longer than the involucre, purplish; peduncles slightly branched, three or four-headed, corymbose. August. *l.*, lowest ones opposite, ovate; upper ones alternate, ovate-oblong, serrated, cuneate at base, entire, the uppermost ones linear-lanceolate. Stem erect, shortly pubescent, paniculate. *h.* 1½ft. Mexico, 1824. (B. M. 1861, under name of *S. hyssopifolia.*)

S. pedata (pedate-leaved). *fl.-heads* loosely corymbose; involucre purplish; florets white, all tubular; anthers dark purple. July to September. *l.* alternate, pedate, generally seven-cleft; leaflets linear, quite entire, with revolute margins; petioles channelled, trifid. Stem erect, branched towards the top. *h.* 1ft. Mexico, 1803. (B. M. 2040.) The correct name of this plant is *Florestina pedata.*

S. pubescens (downy). *fl.-heads* purple; involucre pubescent; pappus paleaceous; corymbs fastigiate, rather dense. August. *l.*, lower ones opposite, sub-spathulate, toothed at apex, attenuated into the petioles; upper ones scattered, linear, sub-entire. Stem simple, somewhat erect, pubescent. *h.* 1½ft. Mexico, 1823.

S. punctata (dotted). A synonym of *S. Eupatoria.*

S. purpurea (purple). *fl.-heads* purple, in slightly coarctate corymbs; involucre pale greenish; pappus paleaceous and three-awned. August. *l.* lanceolate, alternate; lower ones obovate, channelled, narrowed into the petioles, serrulated at apex. Stem erect, velvety-pubescent, much-branched. *h.* 1½ft. Mexico, 1812. (B. R. 93, under name of *S. Eupatoria.*)

S. rhombifolia (rhomb-leaved). *fl.-heads* white or yellow and white, rarely red, in fascicles at the tips of the branches. September. *l.*, lower ones rhomboid-ovate, crenate-serrated; upper ones often alternate, narrower, and more entire. *h.* 1½ft. Mexico, 1827. (B. R. xxiv. 59, under name of *S. fascicularis.*)

S. serrata (saw-edged). *fl.-heads* white or pink, in fastigiate corymbs; pappus bristly, two or often three-awned. August. *l.* alternate, somewhat fascicled, linear-lanceolate, slightly glabrous, serrated, entire at base and attenuated into the petioles. Stem erect, branched, pubescent. *h.* 1½ft. Mexico, 1827. SYN. *S. ivæfolia.*

S. trachelioides (Throatwort-like). *fl.-heads* purple; involucral scales downy, mucronate-acuminate; pappus crown-like, very short; corymbs clustered, many-headed. August. *l.* of the lower branches opposite, cuneate at base or entire, sessile; the rest broadly ovate, slightly acute, deeply crenate-serrate, hairy on both sides. Stem erect, densely velvety-pubescent. *h.* 2½ft. Mexico, 1839. Greenhouse. (B. M. 3856.)

STEWARTIA. *See* **Stuartia.**

STIBASIA. Included under *Marattia.*

STICHUS. A term which, used in Greek compounds, denotes a rank or row: *e.g.*, Distichous, two-ranked.

STICKMANNIA. A synonym of **Dichorisandra** (which *see*).

STIFFTIA (so called after A. J. Stifft, 1760-1836, Imperial Physician in Austria). SYNS. *Aristomenia, Augusta, Sanhilaria.* ORD. *Compositæ.* A genus comprising four or five species of stove, glabrous trees and shrubs, natives of Brazil or Guiana. Flower-heads yellow or orange, large and solitary or few together, or smaller and paniculate; involucral bracts in many series, imbricated, obtuse, appressed, the outer ones gradually shortening; receptacle naked, foveolate; florets tubular, with a limb of five, narrow, revolute lobes; achenes elongated; pappus bristles in many series. Leaves alternate, coriaceous, entire. *S. chrysantha* is a fine, showy, evergreen shrub, requiring a well-drained, turfy loam, and a light, airy situation. It is propagated by cuttings of the young wood, inserted in sandy soil, under a bell glass, in bottom-heat.

S. chrysantha (golden-flowered). *fl.-heads* orange-colour, 2in. in diameter, solitary; florets indefinite; pappus saffron-colour. February to April. *l.* lanceolate, acuminate. *h.* 6ft. Brazil, 1840. (B. M. 4438.)

STIGMA (from *stigma*, a mark; in allusion to the Stigma being a mark or spot on the style). That part of the pistil of a flower which is fitted to receive the pollen when mature, and to permit the passage of pollen tubes for the fertilisation of the ovules. It is peculiar

Stigma—*continued.*

in having its surface covered with long cells, attached loosely by one end to the cells below, with the other end free. These cells secrete a sticky fluid, which retains the pollen grains when they touch it, and also stimulates them to emit tubes (*see* **Pollen**). The tubes can readily pass in between the loosely-arranged cells of the Stigma, and then down the loose "conducting tissue" of the style and ovary. The Stigma has no epidermis upon it, in which it differs from all other parts of flowering plants. It is usually situated on the tip or along one side of the style; or the latter may be absent, in which case the Stigma is situated on the tip of the ovary. It may be displaced from this position by inequality of growth in the two sides of the ovary. Each carpel has a Stigma; but where two or more carpels are closely united, the Stigmata may also be so united as to appear like one. In those flowers that are pollinated by wind (*e.g.*, Grasses), the Stigma is frequently covered with long, spreading hairs; while in those pollinated by insects, and in cleistogamous flowers, the Stigma is usually small, and confined to the tip of the style, or to a narrow line on one side of it.

STIGMAPHYLLON (from *stigma*, and *phyllon*, a leaf; alluding to the stigmas being expanded into a sort of leaf). ORD. *Malpighiaceæ*. A genus comprising about fifty species of handsome, stove, climbing shrubs, natives of tropical America. Flowers yellow; calyx five-parted, eight-glanded; petals unguiculate, unequal, glabrous; stamens ten, unequal, six being perfect; corymbs umbelliform, on axillary and terminal branchlets or peduncles; pedicels minutely bracteate at base, articulated and bibracteolate below the middle. Leaves generally opposite, of two forms, entire or denticulate, rarely lobed; petioles biglandular; stipules minute. The species best known to cultivation are described below. They will grow in a mixture of loam, leaf soil, and peat, with the addition of some sharp sand. Cuttings, made from ripened wood, will root freely if inserted in sandy soil, under a hand glass, in heat, taking about three or four weeks to do so.

S. aristatum (awned). *fl.*, petals fimbriated; umbels pedunculate, few-flowered. June to August. *l.*, cauline ones glabrous, sagittate-hastate, angled, acute; those on the younger branchlets often oblong, entire; petioles biglandular at apex. *h.* 15ft. Brazil, 1832. (B. R. 1659.)

S. ciliatum (ciliated).* Golden Vine. *fl.* large, three to six in an umbel; petals fringed, with long claws. October. *l.* opposite, cordate, oblique at the base, smooth, ciliated, glaucous. Brazil, 1796. A tall climber. (P. M. B. xv. 77.)

S. diversifolium (variable-leaved). *fl.*, pedicels articulated at the base. June. *l.* shining above, pubescent or tomentose beneath, ovate or oblong-linear, rounded or almost cordate at base; petiolar glands close to the leaf. West Indies, 1825. Lofty climber.

S. fulgens (brilliant). *fl.* borne on divided peduncles. Summer. *l.* glabrous above, silvery beneath with silky down, cordate-rounded, mucronulate, repand, entire; basilar sinus open; petioles biglandular a little below the top. West Indies, &c., 1759. Tall climber.

S. heterophyllum (variable-leaved). *fl.* several to an umbel, on solitary, axillary peduncles; sepals erect; petals orbicular. December. *l.* opposite, mostly ovate, waved, entire, very obtuse, mucronate; sometimes broader, almost cordate, deeply three-lobed; lobes oblong, obtuse, mucronate, the side ones spreading. Buenos Ayres, 1842. Tall climber. (B. M. 4014.)

S. jatrophæfolium (Jatropha-leaved). *fl.*, petals fimbriated, shell-shaped; umbel many-flowered. Summer. *l.* palmately five to seven-cleft or parted, acute, serrate-ciliated, cordate, clear light green; petioles biglandular at apex. *h.* 6ft. Uruguay, 1841. (B. R. xxx. 7.)

S. littorale (shore-loving).* *fl.* on pedicels ½in. to 1½in. long; corolla 1in. in diameter; claw of the petals longer than the sepals; peduncles axillary, solitary, many-flowered; corymbs terminal, simple or compound. Autumn. *l.* opposite and alternate, long-petiolate, 2in. to 5in. long, varying in shape. South Brazil, 1882. A tall, leafy climber. (B. M. 6623.)

STIGMAROTA. A synonym of **Flacourtia** (which *see*).

STIGMATIC, STIGMATOSE. Relating to the stigma.

STIGMATIFEROUS. Stigma-bearing.

STIGMATOID. Stigma-like.

STILAGINEÆ. Included under *Euphorbiaceæ*.

STILBEÆ. A tribe of *Verbenaceæ*.

STILLINGFLEETIA. A synonym of **Sapium** (which *see*).

STILLINGIA (named in honour of Dr. Benjamin Stillingfleet, 1702-1771, an eminent English botanist). ORD. *Euphorbiaceæ*. Thirteen species have been referred to this genus; they are stove or greenhouse, glabrous shrubs, inhabiting North and South America, the Mascarene and Pacific Islands. Flowers monœcious, apetalous; males often three under a bract, sub-sessile; females solitary under the lower bracts, sessile or very shortly pedicellate, few in a spike, or the spike sometimes all males; spikes terminal, simple; bracts short and broad, biglandular. Leaves alternate or rarely opposite, shortly petiolate, entire or glandular-denticulate. *S. sebifera*, the Tallow-tree of China, the proper name of which is *Excœcaria sebifera*, is the only species calling for mention here; it yields a hard wood, used by the Chinese for wood engravings; tallow is extensively obtained from the seeds, and the leaves are employed for dyeing black.

STINGING BUSH. A common name for *Jatropha urens*.

STINKING GLADWYN. A common name for *Iris fœtidissima*.

STIPA (from *stipe*, a silky or feathery substance, alluding to the inflorescence). Including *Lasiagrostis* and *Macrochloa*. ORD. *Gramineæ*. A large genus (nearly 100 species) of stove, greenhouse, or hardy, tall or rarely dwarf, perennial grasses, widely distributed over tropical and temperate regions. Spikelets one-flowered, narrow, paniculate, the rachis of the spikelet articulated above the lower glumes; glumes three, narrow, keeled, the two outer ones usually persistent; panicle terminal, often slender, slightly branched. Leaves convolute-terete or rarely flat. A selection from the few introduced hardy species is given below. With the exception of *S. elegantissima*, all are hardy. *S. pennata*, the well-known Feather Grass of gardens, is a very ornamental plant. Stipas thrive in any ordinary soil, and may be increased by seeds or by divisions.

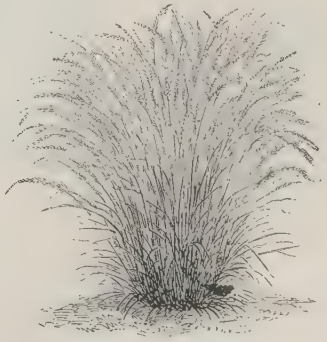


FIG. 535. STIPA PENNATA.

S. elegantissima (very elegant). *fl.*, panicle very loose, 6in. to 8in. long, at length broadly spreading; the rachis and long, filiform branches elegantly plumose with fine, spreading hairs. *l.* narrow, mostly erect, convolute when dry. Stems from a horizontal rhizome, erect and branching, 2ft. to 3ft. high. Australia. Greenhouse.

S. gigantea (gigantic). *fl.*, glumes subulate, much longer than the perianth; perianth ½in. long, naked above; bristles slightly

Stipa—*continued.*

twisted, flexuous, very slenderly pubescent, five times longer than the glumes. *h.* 3ft. Spain, 1823.

S. juncea (Rush-like). *fl.*, glumes subulate, one-third longer than the perianth, the lower ones slightly larger; perianth nearly five lines long, naked above; bristles twisted, plicate, pilose, six times longer than the glumes; anthers bearded. *h.* 3ft. South-west Europe, 1772.

S. Lasiagrostis (Lasiagrostis).* *fl.* shortly stipitate; spikelets one-flowered; glumes two, exceeding the flowers; panicle thickened, branched, diffuse. *l.* flat. Culm often branched. South Europe. Plant tall, erect, showy. SYN. *Lasiagrostis Calamagrostis.*

S. pennata (feathery).* Feather Grass. *fl.*, glumes more than double the length of the perianth, the lower ones rather larger; perianth more than ½in. long, naked above; bristles twisted, plicate, plumed above, eight times longer than the glumes; anthers naked. *h.* 2ft. Europe (said to have been found in Britain, but this is doubtful). This plant has been long grown in gardens: according to Gerarde, the ladies used to wear the beautifully feathered beards as feathers. See Fig. 535

Stipa—*continued.*

S. tenacissima (very tenacious). Esparto Grass. *fl.* stipitate; paleæ membranous, the lower one bifid at apex; panicles spicate, branched, clustered or divaricate. *l.* convolute, filiform. South Europe. A tall grass. SYN. *Macrochloa tenacissima.*

STIPE (from *stipes*, a stalk). A term used in various senses, viz.: 1. The erect, cylindrical stem of a Palm or of a Tree-fern, bearing the persistent leafstalks, or the leaf-scars; in this sense it is equal in meaning to "caudex."

FIG. 536. ERYTHRINA INDICA PARCELLI, showing Glandular Bodies in place of Stipels.

2. A prolongation of the floral axis between any two whorls of a flower, *e.g.*, between the calyx and corolla (as in *Silene*), when it is better called "Anthophore," or between the stamens and pistil (as in *Geum rivale*), forming a "Gynophore," or, when the fruit is ripe, or "Carpophore." 3. The stalk that supports the pileus a cap of **Mushrooms** (which *see*). 4. The leafstalk in Ferns.

STIPELLATE. Furnished with stipels.

STIPELS. Small bodies, like diminutive stipules, situated at the base of each leaflet in certain compound-leaved plants (*e.g.*, *Phaseolus*), but solitary, except that there are two at the base of the terminal leaflet. Leaflets in such leaves are said to be "stipellate." In some plants, *e.g.*, *Erythrina* (see Fig. 536), Stipels are replaced by small, glandular bodies.

FIG. 537. GARDEN VARIETY OF PEA, showing Stipules resembling Leaflets in appearance and in use.

FIG. 538. FLOWERS, LEAF, AND LEAFLET-LIKE STIPULES OF LOTUS JACOBÆUS.

STIPITATE. Having a stipe, or stalk, which is neither a petiole nor a peduncle.

STIPITIFORM. Stalk-like; shaped like a stipe.

STIPULACEOUS, STIPULAR. Belonging to stipules.

STIPULATE. Possessing stipules.

STIPULES (from *stipula*, an upright leaf). Bodies, almost always two in number, and quite alike, situated one at each side of the base of each leaf, in many flowering plants, and in one or two Ferns. Stipules vary much in appearance and size; but the two sides of each are unlike one another. They often resemble leaflets, *e.g.*, in Pea (see Fig. 537), and in *Lotus* (see Fig. 538), and are free from everything but the stem. In these cases, they do the work of leaflets; and they may even wholly replace the leaves in their action on gases, the leaves serving other uses—*e.g.*, tendrils in *Lathyrus Aphaca* (a

FIG. 539. ROSE-LEAF, showing Adnate Stipules.

British weed). In many plants, *e.g.*, Rose (see Fig. 539), the Stipules are small, and are fixed along each side of the base of the leafstalk (this arrangement is called "adnate"); in others, they resemble bud-scales, and serve the same purpose as the latter organs, protecting the

FIG. 540. BRANCHLET OF FAGUS SYLVATICUS, showing Stipules resembling Bud Scales.

tender structures in buds, *e.g.*, Beech (see Fig. 540), Oak. In a few plants, Stipules of each pair are united, and form a single body, opposite the leaf (*Platanus*), or between it and the stem (*Potamogeton*), or form a sheath or "ochrea" around the stem (*Polygonum* and *Rumex*). In the genus *Galium*, they are so like the true leaves that the latter are distinguished only by having the buds in their axils; and the Stipules and leaves together resemble a whorl of true leaves. Frequently, Stipules are so small as to be readily overlooked; and in a good many plants they fall off early, and may thus not be

Stipules—*continued.*

detected. They are very constantly present in certain classes of plants; hence, their presence and their nature afford important characters in the definition of many natural orders. In many orders, they are not constantly met with, and in many others do not occur at all.

FIG. 541. FLOWER-HEAD AND LEAF OF MIMOSA PUDICA, showing Stipules metamorphosed into Spines.

Occasionally, *e.g.*, *Mimosa* (see Fig. 541), they are metamorphosed into spines.

STIRPS. A race, or permanent variety; *e.g.*, the Red Cabbage.

STITCHWORT, or **STITCH GRASS.** *See* **Stellaria.**

STIZOLOBIUM. A synonym of **Mucuna** (which *see*).

STOBÆA. Included under *Berkheya.*

STOCK. The portion of a stem to which a graft is applied; a caudex, rhizome, or root-like base of a stem, from which roots proceed; the term is also used to denote a race.

STOCK, CAPE. A common name for **Heliophila** (which *see*).

STOCKS (*Mathiola*). Stocks are well-known and very popular plants with every class of cultivators, because of their beauty for flowering in pots and in the open border, and of the sweet perfume which their flowers emit. There are several distinct classes or types, all of which have been greatly improved, in course of time, by florists and seedsmen in this country and on the Continent. The different types may readily be divided into Summer and Winter Stocks, the former embracing the whole of the Ten-weeks varieties, and the latter the Brompton, East Lothian, and Intermediate types.

The greater portion of the Ten-week Stock seed is imported annually from the Continent, in spring. It is well to divide the supply, and sow a part towards the end of March, and the rest during April; the least heat from fermenting material is of great help in assisting and hastening germination. So soon as the seedlings appear above ground, plenty of air must be given during favourable weather, and water should be carefully applied, as damping and mildew generally prove very destructive sources of evil. If either commence an attack, the best thing is to prick off all the uninjured plants, about 3in. apart, in new soil. Advantage should be taken to transfer Stocks from a frame into the open border during showery weather; it cannot be done very successfully at any other time, unless the plants have been

Stocks—*continued.*

prepared in small pots. The soil for Stocks can scarcely be too rich; it should, therefore, be well dug and manured; and a top-dressing of leaf mould or short manure is also of great benefit in affording nourishment, and preventing evaporation during dry weather. Summer Stocks are not generally grown in pots; they form good beds outside, when the plants succeed, and their flowers are excellent for cutting.

Of Winter Stocks, the most extensively cultivated are the Intermediate and the East Lothian Intermediate; the latter succeeds well in Scotland. The Brompton Stocks are very vigorous; they flower about May and June, and the seed should be sown nearly a year in advance, or not later than the early part of July. It is always safer to preserve a quantity of plants in cold frames during winter, than to place them outside; they usually suffer more from excessive moisture than from cold. Stocks intended for flowering in pots, should be inserted singly, in small thumbs, early in autumn, and plunged in ashes, in a cold frame. When sufficiently established, and in need of more space, they should be transferred into 5in. pots; this is generally done late in autumn, or early in the following spring, when the double and single-flowered plants can be distinguished from each other. The Intermediate and East Lothian varieties should be selected for cultivating in pots in preference to the Brompton; they have a branching yet compact habit, and flower profusely. The soil used for potting should be of a loamy description, with nearly one-fourth of sifted old mortar intermixed. When the plants are growing, plenty of water is requisite, and manure water is of great help when the flower-buds are developing. Stocks kept in frames through winter, for planting into outside borders, should be transferred to their permanent quarters during March, or as soon afterwards as the weather is considered favourable for their well-being.

Saving Seed for Producing Double Flowers. The following remarks are extracted from the appendix to Dr. M. T. Masters' classical work, "Vegetable Teratology," published by the Ray Society in 1869. The reader is also referred to a leading article in the "Gardeners' Chronicle," 1866, p. 74, and to a separate work by Mons. E. Chaté, "Traité des Giroflées." The last-named author observes that the gardeners of Erfurt "have, for a long time, to a certain extent, monopolised the sale of seeds of these plants. To obtain these seeds, the Erfurt gardeners cultivate the flowers in pots, and place them on shelves, in large greenhouses, giving them only sufficient water to prevent them from dying. So cultivated, the plants become weakened, the pods shortened, and the seeds less numerous, and better ripened; and these seeds give from sixty to seventy per cent. of double flowers. The seeds from these plants are said to be mostly of an abnormal shape, which is so striking that experienced cultivators are able to separate those which would furnish double flowers from those which would produce single ones."

M. Chaté's method, which he calls the French one, gives still greater results, viz.: eighty per cent. of double flowers, and these produced by very simple means. "When my seeds," he observes, "have been chosen with care, I plant them, in the month of April, in good dry mould, in a position exposed to the morning sun, this position being the most favourable. At the time of flowering, I nip off some of the flowering branches, and leave only ten or twelve pods on the secondary branches, taking care to remove all the small weak branches which shoot at this time. I leave none but the principal and secondary branches to bear the pods. All the sap is employed in nourishing the seeds thus borne, which give a result of eighty per cent. of double flowers. The pods, under this management, are thicker, and their maturation is more perfect. At the time of extracting the seeds, the upper portion of the pod is

Stocks—*continued.*

separated and placed aside, because it has been ascertained that the plants coming from the seeds situated in this portion of the pod give eighty per cent. of single flowers. They yield, however, greater variety than the others. This plan of suppressing that part of the pod which yields single flowers in the largest proportion, greatly facilitates the recognition of the single-flowered plants, because there remains to be eliminated from among the seedlings only from ten to fifteen per cent."

This separation of the single from the double-flowered plants, M. Chaté tells us, is not so difficult as might be supposed. The Single Stocks, he explains, have deep green leaves (glabrous in certain species), rounded at the top, the heart being in the form of a shuttlecock, and the plant stout and thickset in its general aspect; while the plants yielding double flowers have very long leaves of a light green colour, hairy, and curled at the edges, the heart consisting of whitish leaves, curved so that they completely inclose it.

Such is the substance of M. Chaté's method of securing so large a proportion of double-flowered plants, and then of separating them from the remaining single ones—a method which commends itself to the good sense of the intelligent cultivator.

Another plan for the separation of the single from the double-flowered plants, in vogue amongst a class of cultivators, is the degustation of the buds, that is to say, the chewing of the young buds: the single plants can be recognised by their crispness and greater consistence, and can thus be weeded out. The disadvantage attending this method is that the plants, single as well as double, must all be grown up to the period when these buds are tolerably well advanced.

STOCK, TEN-WEEKS. A common name for **Mathiola annua** (which *see*).

STOCK, VIRGINIAN. A common name for **Malcolmia maritima** (which *see*).

STŒCHAS. Included under *Lavandula*.

STOKES' ASTER. *See* **Stokesia cyanea.**

FIG. 542. STOKESIA CYANEA.

STOKESIA (named in honour of Jonathan Stokes, M.D., 1755-1831, the coadjutor of Withering in his arrangement of British plants). SYN. *Cartesia.* ORD. *Compositæ.* A monotypic genus. The species is a handsome, sparingly-branched, greenhouse, erect, perennial herb. It thrives in the open border during the summer months. Propagation may be effected by seeds, or by division of the roots.

S. cyanea (blue).* Stokes' Aster. *fl.-heads* blue, 1in. across, few or solitary, terminal, pedunculate; involucre sub-globose, the outer scales prolonged into a leafy, bristly-fringed appendage, the inner ones lanceolate and entire; florets narrowly five-cleft; pappus composed of four or five chaffy scales. August. *l.* alternate, smooth, lanceolate, entire or spinuloso-ciliate at base; lower ones petiolate; upper ones amplexicaul. Stem 1ft. to 1½ft. high. North America, 1766. See Fig. 542. (B. M. 4966.)

STOLE, or STOLON. A branch arising from near the base of the parent stem, resting on the soil, rooting at the tip, and finally tending to form a new plant, capable of independent growth when the branch is cut, or dies away, between the terminal bud and the parent plant. Certain modifications of Stolons have received distinctive names, of which the more important are: Offset, a short Stolon (*e.g.*, *Sempervivum*), and Runner, a very slender Stolon, with long, naked internodes (*e.g.*, Strawberry).

STOLONIFEROUS. Bearing, or propagating by, stolons, runners, &c.

STOMA (plural, *Stomata*; from *stoma*, a mouth). The Stomata are little openings, or mouths, in the outer covering or epidermis of the green parts of plants, through which they may be said to breathe. The air passes into the plant from the outside, bringing with it Carbonic Acid gas. This gas is broken up in the cells containing chlorophyl: all the Carbon, and half of the Oxygen, of the Carbonic Acid are retained by the plant, to be built up into starch, and other foods; and half of the Oxygen escapes from the plant into the outer air, through the Stomata. The air passing out is loaded with vapour of water evaporated from the cells of the leaf; and thus there is a constant escape, through the Stomata, of water from green parts of plants. The form and structure of the Stomata do not vary much in vascular plants; though many groups of these plants exhibit peculiarities in the form and arrangement of the cells of the epidermis that lie round the Stomata, and that are often called the "neighbour-cells"; but it is not necessary here to enter upon a description of the latter. The Stoma, or opening, lies between two sausage-shaped cells, called "guard-cells," which are joined near the ends, but leave a space between them in the middle. This opening leads into an empty space between the cells, below the epidermis, from which space crevices pass in all directions, opening into larger ones among the loosely-arranged cells in the middle of the leaf. There is a constant passage of gases into and out of the cells through the thin cell-walls that border the inter-cellular spaces, with results upon the atmosphere as stated above, if green plants are exposed to daylight. The guard-cells are usually green, owing to the presence in them of chlorophyl. They thus present a contrast to the ordinary cells of the epidermis, which contain few, if any, chlorophyl-bodies in land plants, except in Ferns, and a few others. The guard-cells regulate evaporation from plants, since they swell when full of sap, and become more convex, thus leaving a wider opening between them when a plant contains much sap and would benefit by the evaporation of some of it. In dry weather, when there has been much evaporation, the guard-cells contain less sap, and thus become straighter, and leave a narrower slit; so that evaporation becomes much slower through the Stoma when it requires to be diminished in amount. Stomata seldom occur on parts of plants habitually under ground, or under water, where they would be useless. They are most abundant on leaves, especially on the lower surface, except in some Conifers, and a few other plants, in which

Stoma—*continued.*

they are more numerous on the upper surface. Where the sides of a leaf are equally exposed to light, *e.g.*, in vertical leaves, or phyllodes, the Stomata are disposed in equal numbers on both surfaces. In floating leaves (*Nymphæa*), they occur only on the upper surface, exposed to the atmosphere. The number varies in different plants from a few hundreds to over 300,000, on a square inch of surface of a leaf, but from 20,000 to 150,000 seem to occur most frequently on that space.

Besides the ordinary Stomata for the passage of air, and of water in the form of vapour, many plants possess others of much larger size, placed singly or in groups along the edges of the leaves, above the ends of the veins. They resemble the other Stomata in form, but their guard-cells cannot move, *i.e.*, cannot alter the width of the slit between them. Their use is to permit the escape of water in drops, instead of in vapour. A familiar example of this action may be observed in *Richardia africana*, from the tip of whose leaves drops of water often fall. It is also exhibited in the drops of water that are so frequently seen on the tips of the leaves of young Wheat, and of other Cereals, in damp evenings, when evaporation is slow. The water thus exuded often has Carbonate of Lime in solution, and, as the drops evaporate, this is deposited, in such plants, in a white crust around the waterpores, as such Stomata are called.

STOMATIFEROUS. Stomata-bearing.

STONE. A hard body produced by the ossification of the endocarp or lining of certain fruits, which are commonly known as Stone Fruits; *e.g.*, Apricot, Peach, Plum.

STONECROP. A common name for **Sedum** (which *see*).

STONE ORPINE. A common name for **Sedum reflexum** (which *see*).

STONE PINE. A common name for **Pinus Pinea** (which *see*).

STONNORD. An old name for Stonecrop. *See* **Sedum.**

STOOL. A stemless "mother" plant, from which layers are annually propagated, by bending into the soil.

STORAX. *See* **Styrax.**

STORAX, LIQUID. *See* **Liquidambar imberbe.**

STORING. A term applied to the lifting of certain vegetables, principally root crops, in autumn, and placing them in sand or dry soil, under cover, where a portion can be procured for use at any time during the winter. Beetroots, Carrots, Potatoes, Salsafy, Scorzonera, &c., are well-known examples. The term is also applicable to the preservation of fruits and, indeed, almost anything which has to be housed and kept after maturity for future use.

STORK'S BILL. A common name for **Pelargonium** (which *see*).

STOVE. A plant-house devoted to the cultivation of subjects requiring a high temperature, many of which are amongst the most beautiful, either for their flowers or for their fine foliage. Where large specimens are grown, it becomes necessary to provide accommodation on an extensive scale; but, in the majority of gardens, a single Stove, or a house with a division in the centre, suffices. In a large collection, even of Stove plants, many will need a higher temperature than others: one division of a house may generally be kept hotter than the other, and so the proper requirements are met. When only one house is available, much may be done by keeping such plants as require most heat at the warmest end, and by admitting whatever air is required at the cooler end.

The best form of structure suited for a Stove is that

Stove—*continued.*

known as the span-roofed; the hip-roofed also answers well, but the wall on one side excludes a portion of the light that would be secured in the span. For the successful culture of Stove plants, particularly flowering kinds, the admission of all possible light is one of the most important conditions. When subjected to plenty of light, foliage plants also assume a more beautiful colouring, and have a shorter-jointed growth, than when situated unfavourably regarding this provision for their well-being. A plunging-bed should be provided, and heated either by hot-water pipes with cocoanut fibre above, or by tan; the latter is not always procurable, and is sometimes objected to. In large span-roofed Stoves, of from 15ft. to 18ft. in width, it is generally best to have the plunging-bed in the centre, a path down either side, and a stage next the side all round. This stage should not be of open woodwork if there are hot-water pipes beneath, but made of slate, or constructed of wood, so that some ashes or shells may be placed beneath the pots for retaining moisture.

Ventilation should be arranged so that air cannot, on entering, come in direct contact with the plants; for preventing this, it is best to place side ventilators in the walls near the pipes, and to only use others situated near the top when there is comparatively little difference between internal and external temperatures. Most Stove plants require a light shading from the summer's sun; this is best fixed on rollers, so that it may be let down and drawn up at any time, according to the weather. Generally, plenty of water and a moist atmosphere are necessary in the Stove; the plants must, therefore, be well and carefully drained, and the soil used be of an open description, whether loam or peat, in order that water may readily pass through.

In the arrangement of Stove plants, overcrowding should be avoided, as growth is rapid with many of them, and the plants soon become drawn or one-sided. Cleanliness amongst plants, and also pots, is of great importance: a high Stove temperature favours the multiplication of insects, particularly if a moist atmosphere is not always maintained.

STRAMINEOUS. Straw-coloured.

STRAMONIUM. Included under **Datura** (which *see*).

STRANGEA. Included under **Grevillea** (which *see*).

STRANVÆSIA (named after the Hon. W. Fox Strangways, F.R.S., a learned investigator of the Flora of Europe). ORD. *Rosaceæ*. A monotypic genus. The species is an ornamental, nearly hardy, evergreen, branched tree. It succeeds best when planted against a south wall, and slightly protected during severe weather. Propagation may be effected either by grafting, or by budding upon the common Thorn.

S. glaucescens (grey-leaved). *fl.* white, at length fioccose; calyx persistent, the tube campanulate, the limb of five erect lobes; petals five, sessile, spreading, pilose at base; corymbs axillary and terminal, many-flowered. June. *fr.* orange-coloured, small. *l.* alternate, petiolate, simple, coriaceous, ovate-lanceolate, serrulated; stipules bristly. *h.* 20ft. Temperate Himalaya and Khasia Mountains. (B. R. 1956.)

STRATA (plural of *Stratum*, meaning anything spread out, or strewn over a given surface). A term used to denote the layers in sand or in rocks, such as may be seen in a sand-pit, a slate-quarry, or a chalk-pit. One sees the layers in cuttings as thinner or thicker bands, one above the other; and that they are spread out one above the other can be recognised if each layer is carefully removed from the surface of the one below it. By far the greater number of different kinds of rocks show layers, but some, such as granite and trap, do not. The layers, or Strata, are now believed by all geologists to

Strata—*continued.*

be the result of the sand, or other substances of which rocks are made, having been at first strewed over the surface, on the bottom of seas, lakes, or rivers, less often by wind on the dry land. Gradually, the layers were pressed down by new layers above them, and, at last, often became converted into stone. The age of the Strata can often be determined from fossils of animals and plants that have been covered up in the soft mud, and turned into stone in it. The rocks that do not show Strata have been exposed to great heat, sufficient to melt them, so that any marks of Strata in them have disappeared where they once existed, *e.g.*, in crystalline limestone.

STRATIOTES (from *stratiotes*, a soldier; in reference to the sword-shaped leaves). Water Soldier. ORD. *Hydrocharideæ*. A monotypic genus. The species, *S. aloides* (Crab's-claw, Freshwater Soldier, &c.), is a stoloniferous, submerged, aquatic herb, inhabiting Europe

FIG. 543. STRATIOTES ALOIDES.

(Britain), &c., and resembling a miniature Aloe (see Fig. 543). Owing to the great rapidity with which it increases, its introduction into ornamental waters is not recommended.

STRATUM. A layer of tissue. *See also* **Strata.**

STRAVADIUM (from *tsjeria samstravadi*, the Malabar name of one of the species). ORD. *Myrtaceæ*. A small genus (about five species) of ornamental trees, now included, by Bentham and Hooker, under *Barringtonia*. Calyx three or four-cleft, with imbricated lobes. The two best-known species are described below. They require a compost of two parts loam, one peat, and one sand. Water should be given in abundance, and a moist atmosphere at all times maintained, the temperature ranging from 65deg. to 95deg. Propagated by cuttings, with leaves intact, obtained from the lateral shoots; these, taken off at a joint when the wood is ripe, and inserted in sand, with a hand glass over them, root readily.

Stravadium—*continued.*

S. album (white). *fl.* white, in very long, pendulous racemes June. *fr.* ovate. *l.* cuneate-oblong, acuminate, obsoletely serrulated. *h.* 20ft. Polynesia, &c., 1850.

S. rubrum (red). *fl.* red, in very long, pendulous racemes. June. *fr.* acutely four-angled. *l.* cuneate-oblong, acuminate, obsoletely serrulated. *h.* 20ft. to 30ft. East Indies, 1822. SYN. *Barringtonia acutangula.*

STRAW. A term applied to the above-ground stems of Grasses.

STRAW. This is of great value in gardens, as coverings for protecting plants and vegetable crops against frost; also for placing beneath Strawberry-plants in summer, to keep the fruits from being splashed and soiled by rain. Straw used for covering up potatoes, &c., during winter should be clean and dry; it should also be of a similar description, if procurable, for most purposes of protection. When obtained from stables, in the form of litter, the best may be shaken out, if necessary, and used for surrounding and covering up frames during severe weather; the value of the remainder, for mixing with leaves to form hotbeds and manure, is well known.

STRAWBERRY (*Fragaria*). Several species of *Fragaria* have contributed towards the production of the numerous kinds of cultivated Strawberries. There are few gardens in which some plants are not grown, the fruit being one favoured by everybody, and always held in high esteem. Forced Strawberries are generally the first new fruits of the year, and the operation of preparing and forcing plants is always one of the most important garden operations. It is well known that the fruits are used, when ripe, in various ways, principally for dessert, but also for cooking and preserving.

Propagation. This is effected by seeds, occasionally by division, but most generally by runners. The varieties are preserved true by the latter method; and, with some few exceptions, runners are produced in abundance during summer. The Alpine Strawberries, however, are best raised annually from seed, or, at least, the plants should not be kept more than two years. Seeds of these, and also of any others, if it is desired to raise plants by that method, should be saved from large, well-ripened fruits in summer. The fruits may be crushed, and dried on thick paper, or the pulp may be separated from the seeds by means of water, the seeds being afterwards dried. Only those which are firm and sink in the water should be kept; others that float on the surface are useless. Sow at once, or dry the seed and preserve it until the following spring. At the latter part of summer, a seed-bed, in a sheltered place outside, will answer well, if watering is carefully attended to. Pots and boxes are also suitable. Where a little warmth is at command, such as a gentle hotbed, the seedlings may be brought on rapidly to a size large enough for planting out where they are intended to fruit. Seedling Strawberries, sown early in the season, bear a little late fruit the same year, but a much better crop the year following. If any runners appear which are not required, they should be cut off at an early stage. Increasing by means of division is sometimes practised when runners cannot be secured, but it is not to be recommended, as divided

Strawberry—*continued.*

plants are never certain to succeed. It may best be done, if requisite, in early autumn, or just before growth commences in spring.

Runners afford the best and most general method of propagation. They readily root into the ground, unless it is very hard, and may be lifted with balls and replanted; but a better way is that of layering in small pots of loamy soil, and allowing them to root into it. Runners are entirely supported by the parent until they form roots of their own; this they do readily, when coming in contact with soil that is of a proper description regarding moisture, &c. If pots cannot be spared, runners for planting-out may be procured, well rooted, and in good condition for lifting, by loosening the earth and placing some light, leafy soil beneath them, just when the roots begin forming. The method of layering on pots will be further mentioned in relation to the methods of preparing plants for forcing.

Soil, Planting, &c. Strawberries grow very well in almost any good garden ground, but succeed best in rather strong loam, of a good depth, and in a somewhat moist situation. In a dry summer, the crop frequently proves a failure on plants subjected to a light soil or gravelly sub-soil, as, if flagging is once allowed, the fruits seldom ripen properly. Previous to planting, the ground should be well trenched, and plenty of good manure intermixed. Very stiff soils are not suitable, as they are so liable to cake into hard lumps, which crack open during dry weather. Stiff soils may be much improved by adding rotten leaves, peat, or leaf mould, during the trenching process.

Planting is best performed about the middle of August, or so soon as well-rooted runners can be secured. Some persons layer Strawberries very successfully for planting purposes on small pieces of turf of square or triangular shape, 1in. or more thick: the roots do not then become twisted and interlaced, as they do in pots, and a piece of turf is admirably adapted for them to enter and permeate. The turf may be sunk a little into the ground, and kept watered; in transplanting, they should be be carefully lifted with a trowel. It is not always convenient to prepare land for Strawberries at the season above named; but it is of great importance that the young plants should be put into their permanent quarters early, and receive every encouragement to get them established before winter. That showery weather should be selected, if possible, need scarcely be remarked. Land which has been occupied by early Potatoes or Cauliflowers is not unfrequently in good order for planting with Strawberries without any preparation beyond levelling down, providing the soil is sufficiently heavy, and the situation can be spared. Strawberry-plants that have been forced are available for forming an outside plantation when the fruit has been gathered; but the balls should be thoroughly soaked in water, and the leaves dipped in a soft-soap solution if they are infested with Red Spider—which is sometimes hurtful to such plants—before being put into the ground. When planting Strawberries, the soil, which should be moderately moist, must be rendered quite firm about their roots. Should the weather be dry, watering must be attended to until the plants are thoroughly established; they will need but little further attention for the season. The distance at which to plant varies a little, according to the strength of soil and the varieties. Generally, the rows should be from 2ft. to 2½ft. apart, and the plants about 1½ft. asunder in the rows; but small-fruited varieties (Black Prince and the Alpines, for instance) may be planted much closer together. The soil should never be dug between Strawberry-plants, as there are so many roots near the surface, which would be destroyed. Large weeds may be pulled occasionally by the hand and carried away, to prevent seeds dropping.

Strawberry—*continued.*

Strawberry plantations should be partially renewed every year, as young plants produce larger, and in every way superior, fruit to old ones. Three, or at the most four, years is a limit; when plants have been in one situation for this period, it is best to destroy them, provided others are coming on for a succession. The general treatment of Strawberries outside may be briefly summed up: To keep the fruit clean, the spaces between all fruiting plants should be mulched with short straw or light, clean litter, in May or June, just before the flowers open. For providing nourishment to the roots, a mulching of short, rotten manure may be spread over the surface first, and then the straw above. If runners are not required, they should be cut off at intervals, soon after being formed, unless the parents are disposed to grow too strongly to leaf, when some of the earliest may be left. At the latter part of summer, and early in autumn, considerable growth is made, and another mulching of good manure is generally of great advantage. A full crop must not be expected the following year from young plants; but, if they are put in early, a few nice fruits are generally produced, and also excellent runners for layering to force. Strawberries two and three years old bear the heaviest crops of good fruits. Watering is sometimes a necessity when the fruits are swelling, if droughts prevail or the soil is too light. A good soaking should be administered; a little on the surface is useless. A mulching of manure beneath the straw, as referred to above, helps to keep the ground cool in summer, and prevents, to a great extent, undue evaporation.

Forcing. Before successful forcing of Strawberries can be carried out, it is necessary that strong and well-ripened plants be prepared; this latter subject may, therefore, be referred to at the commencement. So soon as any runners appear, and forcing is intended, layering should be at once commenced. Perhaps the plan most generally adopted is that of layering first on small pots, and then transferring to the sizes in which the plants are intended to bear afterwards. This system is widely practised, more generally, perhaps, than any other; but that here recommended is to layer, whenever practicable, on the fruiting pots in the first instance. This entails more labour at the outset, but the necessity for a second potting is avoided. Both methods may be referred to, as some cultivators favour one and some the other.

For layering on small pots, the size known as 60s are best adapted. They should be washed clean, and then allowed to get dry; no crocks need be used, a little rough fibre from the loam placed in the bottom will afford ample drainage, the remainder being filled with loamy soil, pressed moderately firm. Strawberries for forcing should always be raised from the strongest runners procurable; these are invariably borne earliest in the season, and by plants one or two years old. A single plant is quite sufficient for one pot; it should be placed in the centre, just as roots are forming, and made secure by a peg, the runner being then pinched off just beyond the plant that is layered. Pegs made from stems of common Brake Fern answer well, as they are not required to last long. The runners take root quickly if the soil is kept moist, and soon become sufficiently established for detaching from the parent, and taking away previous to potting on for fruiting. It is important to leave them until well rooted; the check consequent on throwing the plant on its own resources in this respect, is then but little felt; whereas, if there are only a few short roots formed, the leaves often flag, and the plants are slow in recovering strength.

The customary method of proceeding with Strawberries layered on small pots is as follows: When strong roots have fairly permeated the soil, the plants are cut off, taken away, and either stood in some open situation for a few days previous to potting, or potted on at once.

Strawberry—*continued.*

The pots most generally used are of the size known as 32s, which measure about 6in. in diameter. These should be clean, dry, and well drained; a little rough turf is also recommended for placing over the drainage, and, if a sprinkling of dry soot is shaken amongst this, it will materially aid in keeping out large worms, which often enter at the bottom if they have an opportunity.

The best soil for Strawberries in pots is turfy loam, somewhat heavy rather than light, used to the extent of about two-thirds of a compost, the remainder being good, short manure, such as leaf mould, or horse-droppings which have laid for a time, or well-rotted cow-dung. Some cultivators use bone-meal or crushed bones, in preference to other manures, with excellent results. The compost should be suitably moist for ramming firmly with a hand-rammer; and it is important that none of the plants are dry at the time of potting. Stand them in a shady place for a few days, unless the weather happens to be dull, and afterwards place them in an open situation with full exposure to the sun, on a firm bottom, such as gravel or coal ashes, which allows water to pass away, and also keeps worms from entering the pots. As the plants grow, they must be stood wider apart, always allowing sufficient space between them, so that the leaves of one do not overgrow another. The crowns should be kept pointed towards the south, with a view to getting them strong and well ripened by exposure to the sun's influence. Strawberries in pots require constant attention in watering through the summer and early autumn; they need copious supplies whenever it is fine, but, in showery weather, the rain often supplies sufficient moisture for several days together, and growth made under such naturally favoured conditions is then rapid. Before there are any severe frosts, the plants should be stored away for the winter, or until they are required for forcing. They may be plunged amongst dry leaves, in cold pits or frames, where litter or some other covering can be thrown over to exclude frost. On all fine days, and during mild weather, the sashes should be removed: the plants only need protection from heavy rains and sharp frosts. Where frames or pits cannot be spared, the plan of plunging the pots in ashes, one above another, against a south wall is sometimes adopted, the pots being laid on their sides, with the crowns outwards, and all one way. Garden mats may then be laid over them at any time, if it becomes necessary.

Under the system of layering on the fruiting-pot, the mode of treatment is very similar, except that no small pots are used, and, consequently, no second potting is necessary. The large pots (6in.) should be cleaned, well-drained, and filled with good soil, at the first; then taken to the Strawberry plantation, and the selected runners placed on them, in the way previously described. Watering must on no account be neglected, not giving sufficient to cause sourness in the soil, which, it is important to remember, has to serve the roots for the season. When the plants get established, they may be detached from the parents, and afterwards treated in precisely the same way as has been already described. No check consequent on repotting is experienced by plants thus treated; and the pots may, in the first place, be filled rapidly with soil. They are not so readily taken to and from the plantation as when the small size is used; but, on the other hand, when established, they may be taken direct to the place where they are to remain for the summer, and there is no fear of injury from the roots becoming starved, because of delays that often unavoidably occur in getting the work of re-potting completed.

The preparation of plants for forcing has been thus fully detailed, because on it principally depends the success with them when introduced under glass for

Strawberry—*continued.*

fruit-bearing; or, at least, superior forced fruit must not be expected if the crowns are not strong, plump, and well-ripened, at the outset. Strawberry forcing, and its attendant results, are matters of very great importance to most gardeners every season. Under successful management, good fruits may be secured some time during the month of April; earlier than this, the amount of natural heat and light necessary, through all stages, for attaining proper development, is seldom forthcoming. Some of the best-ripened plants of an early variety—such as Keen's Seedling or Vicomtesse H. de Thury—may be introduced under glass, for starting during December, or early in January. The temperature at first must not exceed 40deg. to 45deg. at night, and from 45deg. to 50deg. by day, with air on all favourable occasions. This will be sufficient to excite the crowns to push the embryo flower-stalks and leaves which they contain; but forcing must still be conducted very slowly, even until the time the fruits are set. By the time the plants reach the flowering stage, the days will have lengthened, and full sunlight must be admitted to them, with a free circulation of air—always avoiding a draught. When flowering, an average temperature of about 55deg. must not be exceeded, and the admission of air from some quarter is essential for insuring fertilisation; the atmosphere at this period should be kept somewhat drier than is advisable at any other time, till the fruits are ripe, and syringing must, for a few days, be discontinued. The strongest flowers appear amongst the first that open; and if from nine to a dozen of these can be induced to set properly, it will be a good crop, and all the smaller, secondary flowers may be clipped off so soon as these are safe. During forcing operations, it is important to remember that the four parts of a Strawberry flower are formed in succession, and that the most essential of all, the pistil, arrives last at maturity to perform its allotted function. It must not, therefore, be inferred that, when the calyx appears, and the white petals expand, the other organs are similarly advanced. In early forcing particularly, great care must be taken in regard to temperature and moisture during the whole flowering period. After the crop is set, a higher temperature should be gradually applied, about an average of from 60deg. to 65deg.; or the plants that are sufficiently advanced may be shifted into another house, if there are others coming on for a succession.

Watering must receive special attention. Plentiful supplies are requisite, especially when the fruits are swelling, and no Strawberry-plant should ever be allowed to get quite dry at the root. The application of manure-water is of great advantage while the fruits are swelling, or the plants may be assisted more conveniently, and quite as efficiently, by placing a little artificial manure over the surface of the soil once a week, and watering it in. The effect is most marked just as the first signs of colouring are seen, and this should be the last application made. Syringing may be freely practised until the fruits begin colouring; besides supplying moisture, it materially aids in keeping down Red Spider. When the earliest fruits are nearly ripe, carefully transfer the plants to a cool, airy house for two or three days before gathering; this will often improve the flavour immensely. As the crop is taken, the plants may be turned out and thrown away, or preserved for forming a new plantation, according as they may or may not be required: others will be coming on to take their places. Where large quantities of Strawberries are forced, a Strawberry-house, specially devoted to bringing on successions, is the best arrangement. This should be fitted up with beds or shelves, near the glass, where full exposure to sun and light is at all times secured. The quantity of plants forming a successional batch must

Strawberry—*continued.*

be determined by the total intended to be forced, the space available, and other conditions that are mostly of individual, and not general, application. Forced plants of Vicomtesse H. de Thury Strawberry are sometimes induced to bear a second crop in the following autumn. They are reduced a little at the root, then potted up afresh, and grown on either outside or in frames. Towards autumn, a second crop of flowers appears; and if they set well, the fruits can be ripened with fire-heat, and a fairly good crop secured, that proves invaluable for dessert, even if of second-rate quality, so far out of the natural season. The variety above named is peculiarly noted for this method of treatment; none of the others that are forced are adapted for autumn fruiting with the same degree of certainty.

Insects, &c. Few species have been recorded as noticeably injurious to the Strawberry; but this plant, like almost all other garden herbs, is liable to have the leaves and flower-buds eaten by **Surface Caterpillars,** and the roots devoured by larvæ of **Cockchafers,** and species of **Otiorhynchus,** especially of *O. sulcatus.* Information in regard to the insects, and the best means of lessening the damage done by them, will be found under the headings indicated.

In Ormerod's "Report of Injurious Insects," for 1883, is an account of serious damage done near Chester, in May and June, by the larvæ of a small Moth called in the Report the "Strawberry-leaf Button Moth," *Peronea comparana* (?). The flowers and sides of the leaflets were spun together and eaten by the larvæ, and the result was that badly-infested plants died. "Young Strawberry-plants of twelve months old are never affected; two-year-old plants are affected rather badly, but three-year-old plants are invariably ruined." The larva is cylindrical and green, with a pale yellow head, and is rather bristly. The pupa is pale green, with reddish wing-cases and abdomen. The moth, which appears at the end of June, is under ⅝in. in spread of fore wings, which are pale ochreous, with a large, dark brown, triangular blotch running in from the front margin of each wing two-thirds across it; there is a dark streak inwards from the hind margin near the base of the wing. The hind wings are grey. There is probably a second brood of the insects in autumn. In the "Entomologist" for 1881 (p. 232), an attack, similar to the above, is recorded from near Blairgowrie, in Perthshire, but the moth is named *Peronea aspersana.* Yet it is the same species, perhaps, though apparently there is uncertainty about the correct name. Probably, the remedy suggested in the "Report" quoted above, of skimming the soil, to remove pupæ with it, and with the surface rubbish, would be found useful.

The leaves of Strawberry-plants that have been forced are liable to serious harm from the Red Spider (*see* **Tetranychus telarius**). During the process of forcing, Strawberries are also invariably attacked by Green Fly, which prove very destructive if not checked at first. Fumigating with tobacco-smoke is the best and most effectual remedy, but this should not be done while the plants are in flower. At any stage before flowering, or after the fruits are set, no danger need be apprehended, provided, of course, that the method of fumigating is properly carried out.

The fruit of the Strawberry is liable to be eaten by **Slugs** and **Snails** (which *see*), as well as by Millipedes, such as *Polydesmus* and *Julus* (*see* **Millipedes**). Mice, too, often prove very destructive, by nibbling off the fruits before they are ripe, or by eating the seeds, when they are at all prominent, from ripe fruits.

Fungi. The Fungi parasitic on Strawberries are few in number, and, so far as experience goes, not seriously hurtful to the plants. The most conspicuous in their effects produce spots on the leaves, sometimes in very great profusion. The spots are at first brownish-red, surrounded by a brighter red margin. After a time, the centre becomes white, by separation of the epiderm from the lower tissues, and because of the presence of air below it. In the white area lie imbedded various minute, black specks, which the microscope shows to be pycnidia inclosing sporidia, or perithecia, with spores in asci. The only Fungus of this group recorded from Britain as living on the Strawberry is *Leptothyrium Fragariæ,* which has minute, cylindrical sporidia (each with four or five dots in it) in its pycnidia. On the Continent there have also been recorded: *Ascochyta Fragariæ,* with two-celled sporidia; *Phoma fragaricola,* with one-celled, small sporidia; *Septoria Fragariæ,* with three-septate sporidia; and *Sphærella Fragariæ,* with two-celled spores in asci. The spots produced by all these are much alike; and it is doubtful in how far the various Fungi belong to species really distinct among themselves. When very abundant, they injure the leaves, and thus weaken the plants. It has been observed that plants on clay soils are more liable to attack, and that, if transferred to more open soil, they become almost free from the Fungi. No direct remedy is known, but the plants, though weakened, are seldom killed by the disease.

The fruits, when beginning to decay, in damp places, are often overgrown with moulds. The best preventive is the freer admission of air.

Sorts. Of the hybrid or large-fruited Strawberry so largely cultivated in gardens, a selection of sorts is subjoined, which includes those generally grown for forcing, and for early, mid-season, and late crops outside. Where the object is to give only a selection, and there are so many to choose from, it is not unlikely that some of those omitted are of equal merit with others included. Alpine Strawberries (*F. vesca monophylla*) are represented in Red and White varieties. The Bush Alpine is a distinct Strawberry, inasmuch as the plants produce no runners. There are red and white forms of this, which may be raised from seeds or increased by means of division. The fruits of the Hautbois Strawberry (*F. elatior*) possess a peculiar and strong flavour, which is disagreeable to some people, but much liked by others. A few plants are generally grown in gardens, but rarely a quantity. Runners are freely produced, and afford a ready means of raising or increasing a stock.

Bicton Pine. Fruit creamy-white, sometimes tinged with red where exposed to the sun, large; flesh white, juicy, of fairly good flavour. Mid-season. Plant very productive, of compact habit.

Black Prince. Fruit dark red, shining, changing almost to black when quite ripe, small; seeds prominent. The plant is a free bearer, and forces well. It is valued, both for forcing and outdoor culture, on account of its earliness.

British Queen.* Fruit light scarlet, but not always uniform in colour, frequently very large, often flattened; flesh white, very juicy and richly flavoured. When well grown, this may justly be designated the best of all Strawberries; but the plant is tender, and does not always succeed and bear satisfactorily. It is much esteemed as a late variety for forcing.

Dr. Hogg.* Fruit light red, cockscomb-shaped, very large; flesh pale pinkish-white, solid, very rich. The plant has much the appearance of BRITISH QUEEN, but is much hardier, rather later, and more prolific than that variety.

Elton. Fruit dark red or crimson, large; flesh red throughout, firm, briskly acid; plant very hardy, vigorous, and prolific. A valuable late variety, specially adapted for preserving; it is an almost certain bearer, and ripens in long succession.

Frogmore Late Pine. Fruit dark red, very large. This ripens about the same time as ELTON, and is of better flavour than that variety. Plant of free-bearing habit.

James Veitch. Fruit bright vermilion, very large and handsome; flesh solid, rich and juicy. Plant very robust. A mid-season variety; it sometimes produces fruit of unusual size.

Keen's Seedling.* Fruit dark crimson next the sun, large, roundish; flesh scarlet, rich and agreeably flavoured. This is an

Strawberry—*continued.*

old and well-known variety of great excellence; it is one of the best for forcing, and is invariably included amongst varieties for that purpose. It is also grown extensively outside, where it succeeds admirably.

La Constante. Fruit bright crimson, large, conical; flesh white, tinged red, juicy, briskly flavoured. Plant dwarf; a great bearer; rather late.

La Grosse Sucrée. Fruit dark red, medium or large; flesh pale red; flavour slightly acid. A free-bearing variety, well adapted for forcing.

Loxford Hall Seedling.* Fruit bright crimson where exposed, large, handsome, conical or sometimes cockscomb-shaped; flesh red, solid, of excellent flavour. An invaluable variety, the latest of all, of great excellence.

Lucas. Fruit deep scarlet or crimson, large, conical or sometimes cockscomb-shaped, handsome; flesh solid, highly flavoured. Mid-season or rather early. Plant free-growing and a good bearer.

Marguerite. Fruit bright red, very large, often of an unusual size; flesh juicy and tender. A productive early variety, sometimes used for forcing.

Pauline. Fruit deep red, large, with smooth neck; flesh firm, richly flavoured. A large and very early variety, and a good bearer.

Pioneer. Fruit very dark red, medium-sized; flesh solid, bright red, of rich, brisk flavour. Plant vigorous, a great cropper, one of the earliest.

President.* Fruit bright red, often very large and handsome; flesh light red, solid, highly flavoured. An excellent, free-bearing Strawberry, largely grown for forcing, and still more extensively for general crop outside.

Sir Charles Napier.* Fruit clear light scarlet, large and handsome; flesh pale, firm, briskly flavoured; seeds small, and very prominent. A most abundant bearer, and a variety very extensively grown for market; it is also well adapted for forcing. The plant is unusually tender.

Sir Harry. Fruit dark red or crimson, very large; flesh dark red, very juicy, of excellent flavour. An abundant bearer, grown extensively for market; it ripens at the same season as KEEN'S SEEDLING, which it somewhat resembles.

Sir Joseph Paxton.* Fruit bright crimson, large, even in outline; flesh solid, and richly flavoured. Mid-season or rather early. The plant is hardy, a free bearer, and forces well. This is one of the best and most useful Strawberries grown.

Vicomtesse Héricart de Thury.* Fruit bright red, medium-sized, conical; flesh pale red, solid, brisk and richly flavoured. The plant is compact, and almost evergreen; it is one of the most abundant bearers, and succeeds well forced.

STRAWBERRY-BUSH. A common name for **Euonymus americanus** (which *see*).

STRAWBERRY-TREE. A common name for **Arbutus Unedo** (which *see*).

STREBLANTHERA. A synonym of **Trichodesma** (which *see*).

STREBLORHIZA (from *streblos*, twisted, and *rhiza*, a root; in allusion to the shape of the root). ORD. *Leguminosæ*. A monotypic genus. The species is an elegant, glabrous, half-hardy, climbing shrub, allied to *Clianthus*. Loamy soil, with the admixture of a little charcoal and leaf mould, is most suitable for the culture of this plant. The compost should not be sifted, but broken up by hand, and pressed firmly in the pots. After potting, the plants should be placed in a pit with other hard-wooded subjects, and kept close for a few weeks, being syringed daily. If it is desirable to keep the plants in pots, they can be either trained out on sticks or a trellis, or on pillars or walls, for which purpose they are well adapted. Thorough drainage must be insured when planting out, and the compost may be the same as for potting, a

Streblorhiza—*continued.*

depth of about 18in. being sufficient. Abundance of water must be given at the roots, and the syringe freely used. When grown in pots, the plants will require shifting annually during March or April, previous to which all the laterals should be pruned hard back, and the leading shoots also shortened. Propagation may be effected by seeds, or by cuttings.

S. speciosa (showy). *fl.* flesh-coloured, rather large, in axillary racemes; two upper calyx teeth very short; standard ovate, erecto-patent, sub-sessile; wings short. May. *l.* impari-pinnate; leaflets few, rather large, entire, exstipellate; stipules small. *h.* 3ft. Norfolk Island, 1840. (B. R. 1841, 51, under name of *Clianthus carneus*.)

STREBLUS (from *streblos*, twisted; in allusion to the twisted branches). SYN. *Epicarpurus*. ORD. *Urticaceæ*. A monotypic genus. The species is a stove, unarmed, glabrous shrub or tree. It thrives in a compost of rich loam and fibry peat or leaf mould. Propagation may be effected by seeds; or by cuttings, inserted in sand, under a bell glass, in heat.

S. asper (rough). Paper-tree. *fl.* dicœcious, the males in clustered heads, the females solitary on the peduncles. *l.* alternate, shortly petiolate, slightly toothed, rather rigid, scabrous, penniveined; stipules lateral, small, deciduous. *h.* sometimes more than 20ft. Tropical Asia.

FIG. 544. STRELITZIA REGINÆ.

STRELITZIA (named in honour of the wife of George III., Charlotte of Mecklenburgh-Strelitz). Bird of Paradise Flower; Bird's-tongue Flower. ORD. *Scitamineæ*. A small genus (four or five species) of warm greenhouse, perennial herbs, restricted to South Africa. Flowers large and showy, few in a spathe, shortly pedi-

Strelitzia—*continued.*

cellate, with a long-exserted perianth; sepals three, ovate-lanceolate, long, free; petals unequal, the two lower or front ones united, each one lobed on the outer side towards the upper part, so that the two petals are distinctly halberd-shaped, and conceal within a fold the five perfect stamens, the third or posterior petal much smaller than the other two and somewhat hooded; bracts large and spathe-like, boat-shaped, acuminate; scape terminal or in an upper axil, shortly exserted from the leaf sheaths. Leaves in long, sessile or stalked sheaths, ample, flabellately bifarious. Rhizome sometimes hypogæus, sometimes produced into an erect, woody stem. Strelitzias succeed in a mixture of two parts loam, and one part peat, with a little sand added. They require a liberal supply of water during summer; but very little need be given during winter. The principal methods of propagation are by suckers, and by division of old plants.

Strelitzia—*continued.*

posterior one nearly round, long and abruptly acuminate; spathes four, alternate, livid-green and purplish, at length 1½ft. long; scape shorter than the petioles. May. *l.* oblong, obtuse at base. *h.* 25ft. A superb plant, considered, by the authors of the "Genera Plantarum," to be specifically identical with *S. augusta*. (R. G. 235.)

S. parvifolia juncea (small-leaved, Rush-like). *fl.* purple and yellow; scape equalling the petioles. May. *l.*, blades absent or nearly so (in the type they are linear-lanceolate with flat margins); petioles resembling the stems of large Rushes. *h.* 4ft. (B. R. 516.) The variety *angustifolia* has lanceolate leaf blades, one-seventh the length of the petioles.

S. Reginæ (queen's).* *fl.* orange and purple, large, abundantly produced; scape free, equalling the leaves. April. *l.* very fine, ovate or ovate-oblong, green, mostly equal at base, broadly undulate-crisped on the margins. *h.* 5ft. 1773. This is the most magnificent species of the genus. The seeds are eaten by the Kaffirs. See Fig. 544. (A. B. R. 442; B. M. 119-20; R. G. 1877, 216.) *S. humilis* has been called a "reduced copy" of *S. Reginæ*.

S. R. Lemoinierii (Lemoinier's). A variety with golden-yellow sepals. 1880. (F. d. S. 2370-1.)

FIG. 545. STRELITZIA REGINÆ PROLIFERA, showing Habit and detached Inflorescence.

Seeds, which are also sometimes procurable, should be sown in light soil, and the pots plunged in moist bottom heat.

S. augusta (majestic).* *fl.* whitish; calyx and corolla both pure white; the sagittate petals very short and rounded, the posterior one very small, acuminate. March. *l.* dark green, distichous, 2ft. or more long, 1in. to 1½in. broad, oblong, sub-cordate at base; petioles 3ft. to 6ft. long, slightly glaucous, longer than the scape. *h.* 10ft. 1791. A noble plant. (B. M. 4167-8; F. d. S. 173-4.)

S. farinosa (mealy). *fl.* purple and yellow; scape free, longer than the petioles. February. *l.* oblong, unequal at base; petioles half as long again as the leaves. *h.* 4ft. 1795.

S. humilis (humble). A form of *S. Reginæ*.

S. Nicolai (Prince Nicolajevitsch's). *fl.*, calyx whitish; petals blue, the sagittate ones rather large, triangular-ovate, the

S. R. prolifera (proliferous). This only differs from the type in the longer petiole and shorter blade of the leaf, and in there being two spathes developed on the same scape. See Fig. 545.

S. R. pumila (dwarf). A dwarf, compact variety. 1879.

STREPTANTHERA (from *streptos*, twisted, and *anthera*, an anther; alluding to the shape of the anthers). ORD. *Irideæ*. A small genus (only a couple of species) of dwarf, bulbous, greenhouse plants, natives of South Africa. Flower solitary in the spathe, sessile; perianth with a very short, campanulate tube, and a rotate-spreading limb; stamens affixed to the throat; spathes one, two, or three, sessile at the sides of the peduncles; peduncles two or three in the upper axils. Leaves ensiform-lanceolate, erect or falcately spreading. The

Streptanthera—*continued.*

species are very pretty when in flower. A sandy loam suits them best. Increased by offsets.

S. cuprea (coppery). *fl.*, perianth tube purple; segments of a yellowish-copper colour, purple at base and with a pale yellow spot on each side; spathe two-valved, jagged a little at the point; scape smooth, somewhat flexuous, two to four-flowered. June. *l.* distichous, acute, mucronate; lower ones smallest. Stem about 9in. high, producing two or three scapes. 1825. (P. M. B. i. 8; S. B. F. G. ser. ii. 122.)

S. elegans (elegant).* *fl.*, perianth pure white, slightly tinged with blush, with a bright purple centre, above which is a broken, black, velvety circle, marked with large, bright yellow spots; tube purple, shorter than the spathe, which is streaked with irregular, broken lines; scapes two or three, one or two-flowered. Spring. *l.* distichous, bluntish, with a very short mucro, narrowing as if cut a little above the middle. Stem about 9in. high. 1827. (L. B. C. 1359; S. B. F. G. 209.

Streptanthus—*continued.*

annuals. Seeds should be sown in the open border, late in spring; or the seedlings may be reared on a gentle hotbed, and afterwards planted out.

S. hyacinthoides (Hyacinth-like). *fl.* deep bluish-purple; sepals lanceolate, acuminate; petals spathulate-linear, the limb reflexed. September. *l.* sessile, narrow below, but clasping, oblong-linear, acuminate. Stem simple or branching, 2ft. to 3ft. high. 1834. (B. M. 3516.)

S. maculatus (spotted).* *fl.* very showy, in simple or panicled racemes; calyx purplish; petals deep velvety-purple in the middle, lighter towards the crenulate edge; pedicels 3in. to 4in. long, spreading. August. *l.* ovate-oblong, 3in. to 6in. long, glaucous, rather acute; cauline ones clasping by long and obtuse lobes. Stem 1½ft. or more high. 1833. (B. M. 3317, under name of *S. obtusifolium.*)

STREPTIUM. A synonym of **Priva** (which *see*).

FIG. 546. STREPTOCARPUS POLYANTHA, showing Habit and detached Flower.

STREPTANTHUS (from *streptos*, twisted, and *anthos*, a flower; alluding to the twisted claws of the petals in some species). ORD. *Cruciferæ*. A genus comprising, according to Asa Gray, about thirteen species of hardy, glabrous, annual or perennial herbs, natives of mostly Western North America. Flowers purple, rarely white or yellow, ebracteate, rarely bracteate, sometimes pendulous; two or all of the sepals saccate at base, often coloured, sometimes very broad; petals unguiculate, the claw straight or twisted. Leaves entire, or the lower ones lyrate-pinnatifid; cauline ones sessile or amplexicaul. Two species have been introduced; both are

STREPTOCARPUS (from *streptos*, twisted, and *karpos*, a fruit; the capsule is spirally twisted). Cape Primrose. ORD. *Gesneraceæ*. A genus comprising about a dozen species of pretty, stove or greenhouse, often villous or woolly herbs, sometimes stemless with spreading radical leaves, or rarely caulescent with opposite leaves (in some of the species, there is only one leaf in the adult state; this being, in reality, one of the cotyledons, which has developed to an enormous extent); they are natives of South and tropical Africa and Madagascar. Flowers pale, purplish, blue, or reddish, showy; calyx five-parted; corolla tube straight, declined, or incurved; limb ob-

Streptocarpus—*continued.*

liquely bilabiate, spreading, the posterior lobe bifid, the anterior and larger one trifid; perfect stamens two; peduncles scape-like or axillary, sometimes one or two-flowered, sometimes cymosely many-flowered; bracts small. Most of the species have been introduced. They thrive in any rich soil or vegetable mould; and may be readily increased by divisions, or by seeds. All are perennials, and, except where otherwise stated, natives of South Africa.

S. bifloro-polyanthus (hybrid). *fl.* pale lilac-blue; peduncles two to four-flowered. *l.* rosulate, oblong, rugose, crenate. 1882. Garden hybrid. Greenhouse. (F. d. S. 2429.)

S. caulescens (caulescent). *fl.* produced in pedunculate cymes; corolla pale lilac, ½in. in diameter. Summer. *l.* in pairs, shortly stalked, elliptic, obtuse. Stem curious, gouty, hairy, giving off leafy branches. Eastern tropical Africa, 1885. Stove. (B. M. 6814.)

S. Dunnii (Dunn's).* *fl.* 1½in. or more long, at length drooping; corolla pale or bright rose-coloured with a bright red tinge, between tubular and funnel-shaped, the lobes rounded; scapes six to eight or more, erect, 1ft. high, bearing much-branched panicles. May and June. *l.* solitary, 1½ft. to 3ft. long, sessile, horizontal and decurved, broadly oblong, obtuse, rounded at base, finely pubescent above, tomentose beneath. Stem very short. Transvaal, 1884. (B. M. 6803.)

S. Gardeni (Capt. Garden's). *fl.*, corolla 2½in. long; tube whitish or pale green, moderately curved downwards; limb pale lilac, the lower three lobes streaked with blood-colour; scapes two-flowered. Summer. *l.* all radical and pressed close to the earth, ovate-oblong, cordate at base, on rather short petioles, crenated, downy, crisped. *h.* 6in. 1854. Allied to *S. Rexii*. Warm greenhouse. (B. M. 4862; F. d. S. 1214.)

S. Greenii (Green's). A free-flowering garden hybrid between *S. Rexii* and *S. Saundersii*, of dwarf, compact habit. 1882. Stove. (G. C. n. s., xvii., p. 303.)

S. Kirkii (Kirk's). *fl.* produced in loose, axillary, pedunculate cymes; corolla lilac, ¾in. long. Summer. *l.* petiolate, cordate-elliptic, obtuse, pubescent. Stem distinct, erect, pubescent. Eastern tropical Africa, 1884. Stove. (B. M. 6782.)

S. parviflora (small-flowered).* *fl.* numerous, sub-paniculate; corolla white, with faint purplish streaks on the three lower lobes, the tube ⅔in. long, the lobes ⅓in. long; scapes longer or shorter than the leaves, slender, hairy. June. *l.* sub-erect, numerous, tufted, 5in. to 9in. long, 1½in. to 2in. broad, sessile, oblong or ovate- or lanceolate-oblong, obtuse, crenulate, wrinkled, densely velvety. 1882. Greenhouse. (B. M. 6636.)

S. polyantha (many-flowered). *fl.* panicled; corolla pale blue, 1½in. long, the tube much curved, the limb very oblique, the lobes toothed; scapes one to three, 1ft. or more high. Summer. *l.* few, about two pairs, pressed on the soil, unequal in size, one of the pair being 1ft. long and the opposite one scarcely 2in., both cordate-oblong, wrinkled, and downy. 1854. Greenhouse. See Fig. 546. (B. M. 4850; F. d. S. 1168; R. G. 206; R. H. 1862, 250.)

S. Rexii (Rex's).* *fl.* bluish; calyx lobes slightly obtuse, ⅓in. long; corolla 1½in. long; scapes bibracteate above the middle, one or sometimes two-flowered. June. *l.* all radical, prostrate, ovate-oblong, crenate, wrinkled, pubescent, much wrinkled and paler beneath. *h.* 6in. 1824. Stove. (B. R. 1173; R. G. 204.) SYN. *Didymocarpus Rexii* (B. M. 3005; H. E. F. iii. 227).

S. Saundersii (Saunders')* *fl.* pale blue, drooping, on pedicels 1in. long; corolla 1½in. long, funnel-shaped, the tube broad and nearly straight, the limb very oblique; cyme compound; scapes several. Summer. *l.* solitary, radical, 1ft. long, 8in. to 9in. broad, cordate, obtuse, velvety, coarsely serrated, pale yellowish-green above, rose-purple and very tomentose beneath. *h.* 1ft. 1860. Stove. (B. M. 5251; F. d. S. 1802; R. G. 826.)

STREPTOPUS (from *streptos*, twisted, and *pous*, a foot or stalk; alluding to the peduncles, which are abruptly bent or contorted near the middle). Twisted Stalk. SYNS. *Hekorima, Hexorima*. ORD. *Liliaceæ*. A genus comprising four species of greenhouse or hardy, perennial herbs, natives of Europe, temperate and mountainous Asia, or North America. Flowers medium, solitary or twin at the axils, nodding; perianth pink or whitish, campanulate or expanded, deciduous, the segments distinct or scarcely connate at base, sub-equal; stamens six; bracts minute or wanting. Leaves alternate, ovate or lanceolate, membranous, sessile or amplexicaul. Three of the species are in cultivation. They are interesting plants, of common culture in any light soil. Propagation may be easily effected by seeds, or by divisions.

S. amplexicaulis (stem-clasping). *fl.* on long peduncles, which are abruptly bent above the middle; perianth greenish-white,

Streptopus—*continued.*

the segments ¼in. long; anthers tapering to a point; stigma entire. June. *l.* very smooth, glaucous beneath, strongly stem-clasping. Stem 2ft. to 3ft. high, very smooth except at base. North America, Europe, &c. 1752. Hardy. SYN. *S. distortus*.

S. distortus (distorted). A synonym of *S. amplexicaulis*.

S. roseus (rosy).* *fl.*, perianth rose-purple, more than half the length of the slightly bent peduncle; anthers two-horned; stigma three-cleft. May. *l.* green on both sides, finely ciliated. Branches sparingly beset with short, bristly hairs. *h.* 1½ft. North America, 1806. Hardy. SYN. *Uvularia rosea* (B. M. 1489).

S. simplex (simple). *fl.* mostly solitary, rarely twin; perianth whitish, broadly funnel-shaped, five to six lines long; pedicels 2in. to 3in. long. June. *l.* oblong, acuminate, deeply cordate-amplexicaul, 2in. to 4in. long, glaucescent beneath. *h.* 2ft. to 3ft. Nepaul, 1822. Greenhouse.

STREPTOSOLEN (from *streptos*, twisted, and *solen*, a tube; referring to the form of the corolla-tube). ORD. *Solanaceæ*. A monotypic genus. The species is a very handsome, greenhouse, evergreen, scabrous-pubescent shrub. It thrives in common soil, but prefers a sandy compost. Propagation may be effected by cuttings, inserted in sand, under a glass.

S. Jamesonii (Jameson's).* *fl.* orange-coloured, pedicellate, disposed in terminal, corymbose panicles; calyx tubular-campanulate, shortly five-cleft; corolla tube elongated, spirally twisted below, enlarged above; limb of five broad, bilabiate lobes; perfect stamens four. June. *l.* entire, not very large, ovate, acute at both ends, bullate-rugose, on long petioles. *h.* 4ft. Columbia, 1847. (G. C. n. s., xxi., p. 797; R. H. 1883, p. 36; B. M. 4605, F. d. S. 436 and P. M. B. xvi., p. 6, under name of *Browallia Jamesonii*.)

STRIATE. Marked with fine longitudinal lines, streaks, or diminutive grooves or ridges.

STRICT. Very straight and upright.

STRIGILIA. A synonym of **Styrax** (which *see*).

STRIGILLOSE. Minutely strigose.

STRIGOSE. Beset with strigæ, *i.e.*, sharp, close-pressed, rigid hairs or bristles.

STRINGY BARK TREE *See* **Eucalyptus obliqua.** The name is also applied to several other species of *Eucalyptus*.

STRIPED SQUILL. *See* **Puschkinia scilloides.**

STROBILA. A synonym of **Arnebia** (which *see*).

STROBILACEOUS, STROBILIFORM. Relating to, or resembling, a strobile.

STROBILANTHES (from *strobilos*, a cone, and *anthos*, a flower; alluding to the form of the inflorescence, particularly when in a young state). Cone Head. Including *Goldfussia*. ORD. *Acanthaceæ*. A large genus (about 180 species) of stove, usually erect herbs or sub-shrubs, for the most part natives of the East Indies, a few extending as far as China and Japan, and the Malayan Archipelago, and one being found in tropical Africa. Flowers blue, violet, or white, very rarely yellow, capitate, or in strobiliform or interrupted spikes, or panicled, sessile or sometimes pedicelled; calyx deeply and nearly equally five-cleft, or two-lipped, with one lip very shortly three-toothed; corolla tubular-ventricose, straight or curved, with five ovate or round, nearly equal lobes; stamens four or two; bracts and bractecles large or small or absent. Leaves opposite, often unequal (in *S. anisophyllus* often apparently alternate), toothed or nearly entire, often bearing raphides. The species described below are very beautiful, stove sub-shrubs, all from India, and merit a place in every collection. They are of easy culture in any light soil. Propagation may be effected by cuttings, inserted in similar soil, under a glass, in heat.

S. anisophyllus (unequal-leaved).* *fl.* lavender-colour; corolla 1¼in. long; bracts elliptic, obtuse; heads small, often cymose. June. *l.* very unequal or pseudo-alternate, lanceolate, acuminate at both ends, glabrous, 3½in. long, ¾in. to 1in. broad, the opposite leaf of each pair 1¼in. long and ⅝in. broad, or obsolete. *h.* 2ft. to

Strobilanthes—*continued.*

3ft. 1823. SYNS. *Goldfussia anisophylla* (B. M. 3404), *Ruellia anisophylla* (H. E. F. 191), *R. persicifolia* (B. R. 955).

S. consanguineus (related). *fl.* blue, in compound, axillary and terminal spikes; corolla ⅔in. long, the lobes ovate, acute. June. *l.* ovate, acuminate, obscurely toothed, glabrate, prominently lineolate above. *h.* 2ft. to 5ft. 1873.

S. glomeratus (clustered).* *fl.* purplish; corolla 1¼in. to 2¼in. long, glabrous; heads ovoid, sub-sessile, hairy, often pseudo-axillary. November. *l.* ovate, 4½in. long, acute, serrated, narrowed or rounded at base, villous above, less so beneath; petioles ¼in. to 1in. long. *h.* 2ft. to 6ft. 1838. (B. 155, and B. M. 3881, under name of *Goldfussia glomerata.*)

S. g. speciosus (showy). *fl.* of a full, if not bright, purple, showy. (B. M. 4767, under name of *Goldfussia glomerata speciosa.*)

S. isophyllus (equal-leaved).* *fl.* lavender-colour, similar to those of *S. anisophyllus.* Autumn. *l.* opposite, nearly equal, linear-lanceolate, attenuated at both ends, glabrous, 3in. long; petioles ¼in. or less in length, or wanting. *h.* 1ft. to 2ft. 1845. (B. 244 and B. M. 4363, under name of *Goldfussia isophylla.*)

S. Sabinianus (Sabin's). *fl.* lavender-colour; corolla 1¼in. long, curved, much ventricose, nearly glabrous; spikes 2in. to 4in. long, pubescent, mostly solitary. March. *l.* petiolate, broadly elliptic, shortly acuminate at both ends, 6½in. long, nearly entire; uppermost ones often sessile and cordate. *h.* 2ft. to 5ft. 1826. (B. R. 1238, under name of *Ruellia Sabiniana.*)

S. scaber (rough). *fl.* yellow; corolla symmetric, ⅔in. to 1in. long, very hairy within; bracts 1in. long; spikes 1in. to 2in. long, dense, often clustered, hairy. May. *l.* elliptic or obovate, acuminate, 4½in. long, coarsely scabrous or nearly smooth; petioles ⅔in. long. *h.* 1ft. to 3ft. 1836. A pubescent or hairy shrub. (B. R. xxvii. 32.)

S. sessilis (sessile). *fl.* pale purple; corolla 1¼in. long, nearly straight, slightly hairy within and without; spikes 1in. to 2in. long, cylindric, exactly strobiliform. April. *l.* sessile, ovate, acute, hairy, ⅔in. to 1½in. long, rounded or nearly cordate at base. Stems numerous, erect, 1ft. to 1½ft. high. 1833. (B. M. 3902.)

S. Wallichii (Wallich's).* *fl.* blue, solitary or in pairs; corolla 1¼in. long, nearly straight, with short, round segments; lower bracts leaf-like; spikes 1in. to 6in. long, often flexuous or zigzag. October. *l.* elliptic, acuminate, 3in. long, puberulous or glabrous, on petioles ⅔in. long; upper ones sessile and cordate. *h.* 6in. to 2ft. 1858. (B. M. 5119, under name of *Goldfussia Thomsoni.*)

FIG. 547. OVAL STROBILES OF HOP, showing thin, membranous Bracts.

STROBILE (from *strobilos*, a Fir-cone). A scaly fruit, composed chiefly of a number of bracts that overlap one another like the slates on a roof. It is defined by Lindley as "an imbricated scaly inflorescence; a collection of hard scales, representing distinct flowers, arranged spirally but closely imbricated;" but the term is seldom employed for the inflorescences, which rather belong to the type called Catkins, and become Strobiles only when the seeds are approaching ripeness. The word Cone is employed with almost the same meaning as Strobile, though in general almost restricted to the fruits of the *Coniferæ*, while the latter word also includes the fruits of the Hop, and of a few other plants.

Strobile—*continued.*

FIG. 549. ROUND STROBILE OR CONE OF CUPRESSUS, with the Scales separating, showing woody Bracts expanded into a shield-like Plate.

The Strobile is the result of the fertilisation of several flowers (there is usually one in the axil of each of the bracts of which it is composed); but the flowers are in most cases completely hidden from sight by the bracts. The latter become much enlarged as the seeds are ripening. They remain thin and membranous in some plants, *e.g.*, Hop (see Fig. 547). Among the *Coniferæ*, they usually become woody and hard; in some, *e.g.*, *Cedrus* (see Fig. 548), they remain comparatively thin; but in others, *e.g.*, *Cupressus* (see Fig. 549), each bract expands towards the tip into a broad, shield-like plate.

FIG. 550. FRUITING BRANCHLET OF JUNIPERUS COMMUNIS HIBERNICA, showing oval, berry-like Strobiles, sometimes called Galbulus.

FIG. 548. FRUITING BRANCHLET OF CEDRUS LIBANI, bearing an oval Strobile or Cone, with thin, woody, imbricated Bracts.

In the genus *Juniperus*, the bracts become soft and fleshy, and are united by their edges, so as to form a fruit which, at first sight, very much resembles a berry

Strobile—*continued.*

FIG. 551. FRUITING BRANCHLET OF JUNIPERUS DRUPACEA, showing rounded Strobiles, with fleshy Bracts, resembling Berries.

(see Figs. 550 and 551). This form is sometimes distinguished by the name of Galbulus. In *Coniferæ*, the seeds are not inclosed in carpels; but, in most, they lie, as represented in Fig. 552, in pairs, on the upper surface of scales, of which one is present in the axil of each bract. There has been much controversy about the true nature of the scales; but a widely-accepted view is that they represent two leaves, arising from an undeveloped branch in the axil of the bract, united together by one side, and that they correspond to open carpels.

FIG. 552. PICEA EXCELSA, showing (1) Fruiting Branch, bearing slender Strobile, (2) Scale with Seeds in position, and (3) Seed.

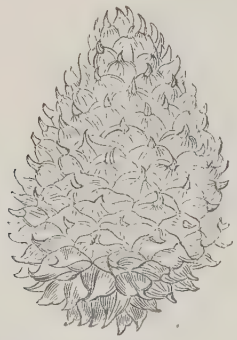


FIG. 553. STROBILE OR CONE OF PINUS PUNGENS.

Strobile—*continued.*

FIG. 554. STROBILE OR CONE OF SEQUOIA GIGANTEA.

As regards their forms, Strobiles are usually elongated cones, as, indeed, is implied in the equivalent term, Cone; but frequently they are oval or globular, and occasionally they are comparatively slender. Some of the commoner

FIG. 555. STROBILE OR CONE OF PINUS SYLVESTRIS.

Strobile—*continued.*

forms are shown in the figures referred to above, and in those of *Pinus* and *Sequoia* (see Figs. 553, 554, and 555, the last being all conical).

STROBILORACHIS (from *strobilos*, a cone, and *rachis*, a flower-stem; alluding to the form of the inflorescence). ORD. *Acanthaceæ*. A small genus (two species) of stove, evergreen, Brazilian shrubs, now included, by the authors of the "Genera Plantarum," under *Aphelandra*. Bracts ample, slightly coriaceous, coloured; spikes long. For culture of *S. prismatica*, the only species which calls for description, *see* **Ruellia.**

S. glabra (smooth). A synonym of *S. prismatica.*

S. prismatica (prism-like). *fl.* yellow; corolla 1¼in. long, glabrous, funnel-shaped; bracts yellow, oval, 1in. long, pungent-pointed, rigid. June. *l.* oblong, 9in. to 12in. long, 2¼in. to 3¼in. broad, acute at base, attenuated at apex; petioles 1½in. long, glabrous. *h.* 2ft. to 3ft. SYNS. *S. glabra, Hydrometstus maculatus* (B. M. 4556).

Stromanthe—*continued.*

S. amabilis (lovely). *l.* deflexed, oblong-ovate, acuminate, unequal-sided, the surface ornamented by narrow bands of dark and light green in the direction of the veins, much broader spaces of silvery-grey intervening; petioles rather tall, cylindrical. 1875. A very ornamental foliage plant. (B. H. 1875, 15-17, f. 2.)

S. Lubbersiana (Lubbers'). *l.* oblong, acuminate, irregularly wedge-shaped at base, smooth, greyish beneath; upper surface prettily marbled with yellow, pale and dark green, in spots and irregular bands. 1880. A good foliage plant. (B. H. 1882, i.)

S. Porteana (Porte's). *fl.* spicate; spikes compound, solitary or twin; rachis geniculate, villous; bracts distichous, imbricated. *l.* ovate or lanceolate, pubescent or villous, of a pleasing green above, paler beneath. 1859. A handsome, dwarf plant.

S. sanguinea (bloody).* The correct name of plant described in this work as *Phrynium sanguineum.* See Fig. 556. (F d. S. 785.)

S. spectabilis (remarkable). *fl.*, bracts, pedicels, and calyx deep red; corolla whitish; common peduncle slender, longer than the leaves; branchlets three to five, fascicled, sub-umbellate, compound-paniculate at apex. *l.* ovate-oblong, rounded at base, glabrous, of a pleasing green above, paler beneath. SYN. *Thalia spectabilis* (L. J. F. 401).

FIG. 556. STROMANTHE SANGUINEA, showing Habit and portion of detached Inflorescence.

STROMANTHE (from *stroma*, a couch, and *anthos*, a flower; alluding to the form of the inflorescence). SYN. *Maranta* (in part). ORD. *Scitamineæ*. A small Brazilian genus (three or four species) of handsome, stove perennials. Sepals three, free, oval-oblong, slender, equalling the corolla; petals three, slightly narrower than the sepals; bracts and bracteoles spathe-like, coloured, spreading; inflorescence borne on a long and rather loose peduncle, more or less compound, often branched from the base, rarely narrow and nearly racemiform, often wholly blood-coloured. Leaves petiolate, in very short sheaths. Stems leafy, erect, slightly branched, marked with long leaf-sheaths. For culture, *see* **Calathea.**

STROMATOPTERIS. Now included under *Gleichenia.*

STROMBULIFEROUS, STROMBULIFORM. Spirally twisted into a screw shape; *e.g.*, the pods of some species of *Medicago.*

STROPHANTHUS (from *strophos*, a twisted cord or rope, and *anthos*, a flower; alluding to the produced corolla segments). ORD. *Apocynaceæ*. A genus comprising about eighteen species of stove or greenhouse, glabrous, pubescent, or villous shrubs or small trees, often climbing, natives of tropical Africa and Asia, one being found in South Africa. Flowers white, yellowish,

Strophanthus—*continued.*

orange, red, or purple, showy, rarely small; calyx five-parted; corolla funnel-shaped, the throat partly closed by ten scales; lobes five, twisted, usually produced into five very long, tail-like appendages; stamens affixed at the summit of the tube; cymes terminal, sometimes dense and few-flowered, sometimes corymbose and many-flowered. Leaves opposite, penniveined. All the species which have been introduced to cultivation are described below. They are both interesting and beautiful shrubs, of easy culture in a compost of sandy loam and peat. Propagation may be readily effected by cuttings, inserted in sand, under a glass, in a little heat.

S. Bullenianus (Bullen's). *fl.* salver-shaped, having a pinkish tube and a yellow limb marked with purplish spots, the long, tail-like apices of the limb segments being purple; cymes loosely branched. Summer. *l.* elliptic-oblong, on short petioles. Western tropical Africa, 1870. A hispid, stove climber. (G. C. 1870, p. 1471.)

S. capensis (Cape of Good Hope). *fl.* yellowish; corolla lobes 1½in. long; peduncles terminal, longer than the leaves, two to four-flowered. June. *l.* approximate, ternate, obversely lanceolate, obtuse or sub-acute, 1½in. long, attenuated into a petiole two lines long. Branches erect, glabrous. *h.* 3ft. Cape of Good Hope, 1860. Greenhouse. (B. M. 5713.)

S. dichotomus (dichotomously-branched). *fl.* whitish; tails of corolla segments purple, 3in. long; scales curled. February and March. *l.* oblong or oblong-obovate, 4in. long, acute and narrowed at base, abruptly acuminate at apex; petioles three to four lines long. Branches and peduncles dichotomous. *h.* 3ft. East Indies, 1816. Stove.

S. divergens (diverging). *fl.* greenish; throat of corolla striped with red, the lobes 1½in. to 1¾in. long; cymes few-flowered. June. *l.* elliptic-oblong, almost acute at both ends, mucronulate at apex, glabrous. *h.* 4ft. China, 1816. Stove. (B. 150 and B. R. 469, under name of *S. dichotomus chinensis.*)

S. sarmentosus (sarmentose). *fl.* reddish-purple, fasciculate, lateral and terminal, or ternate; calyx lobes ½in. long; lobes of the corolla nearly 2in. long. June. *l.* elliptic, acuminate, slightly acute at the base. Branches cylindrical, sarmentose. *h.* 5ft. Sierra Leone, 1824. Stove.

STROPHIOLE. A tubercle found surrounding the hilum of certain seeds.

STROPHOLIRION (from *strophos*, a twisted rope, and *lirion*, a lily; in allusion to the shape of the flower stem and the affinities of the plant). SYN. *Rupalleya.* ORD. *Liliaceæ.* A monotypic genus. The species, *S. californicum*, is the plant described in this work under the name of *Brodiæa volubilis.*

STRUKERIA. A synonym of **Vochysia** (which *see*).

STRUMA. A cushion-like swelling.

STRUMARIA (from *struma*, a tubercle; alluding to the style being swollen in the middle). SYNS. *Eudolon, Hymenetron, Pugionella, Stylago.* ORD. *Amaryllideæ.* A genus of greenhouse, bulbous plants. Six species have been described, natives of South Africa. Flowers numerous, in an umbel, on filiform, scarcely spreading pedicels; perianth campanulate, with scarcely any tube, the segments equal, erecto-patent; filaments more or less connected; involucral bracts two, lanceolate, the inner ones smaller; scapes solid. Leaves loriform. A selection from the introduced species is given below. Several plants formerly included here will now be found under **Hessea.** The species thrive in well-drained, sandy loam, and, after the leaves begin to discolour, require a thorough season of rest. Propagated by division, or by seeds.

S. angustifolia (narrow-leaved). *fl.* scented like those of *Lilium Martagon*; perianth white, flesh-coloured outside, the segments equal and much-spreading; scape lateral, erect, umbellately about eight-flowered. April. *l.* few, linear, slightly obtuse, flat, entire, shining; sheath radical, erect, 1in. to 2in. high. *h.* 6in. 1795.

S. rubella (reddish). *fl.* six to ten, umbellate, inodorous; perianth reddish and flesh-coloured, much spreading; bracts purplish; scape lateral, nearly 1ft. high. May. *l.* linear,

Strumaria—*continued.*

oblique, slightly obtuse, entire, 5in. to 9in. long, ⅛in. broad; sheath wanting. 1795.

S. spiralis (spiral). A synonym of *Carpolysa spiralis.*

S. stellaris (starry). A synonym of *Hessea stellaris.*

S. truncata (truncate). *fl.* many, umbellate, inodorous, on slender, erect pedicels; perianth white, reddish at base, the segments much spreading; bracts purplish, erect. April. *l.* tongue-like, obtuse, nearly erect, from 6in. to 8in. long, ½in. broad, all included at base in a dark blood-coloured sheath. 1795.

STRUMOSE, STRUMIFEROUS. Bearing a struma.

STRUTHIOLA (from *struthion*, a little sparrow; alluding to the resemblance of the seeds to a beak). SYN. *Belvala.* ORD. *Thymelæaceæ.* A genus comprising about a score species of pretty, greenhouse, evergreen, Heath-like shrubs or under-shrubs, restricted to South Africa. Flowers white, red, or yellow, sub-sessile in the upper axils, solitary or rarely twin; perianth tube slender, the lobes four, spreading; stamens four, included in the tube; bracteoles two, short, narrow, stipitate. Fruit small, dry. Leaves opposite or rarely scattered, rather small, coriaceous, often loosely imbricated. The best-known species are here described. They thrive in sandy peat. Propagation may be effected by cuttings, inserted in sand, under a glass.

S. erecta (erect). *fl.* pink or white, five to six lines long, the lobes acuminate. June. *l.* clustered, linear-lanceolate, acute, spreading, one to three-nerved at back, not ciliated. Branches slender, straight. *h.* 1½ft. 1798. Shrub highly glabrous. (B. M. 2138; L. B. C. 74.)

S. linearifloba glabra (linear-lobed, glabrous). *fl.* reddish or white, scarcely ¼in. long; lobes linear, obtuse. June. *l.* half-spreading, needle-like, convex at back, almost nerveless, glabrous. *h.* 2ft. 1820. (B. M. 222, under name of *S. erecta*; L. B. C. 75, under name of *S. juniperina.*)

S. longiflora (long-flowered). *fl.* reddish or yellowish, densely tomentose, eight to twelve lines long; lobes ovate-oblong. July. *l.* imbricated, ovate- or linear-lanceolate, slightly acuminate, rather obtuse, slenderly striated, glabrous, ciliated, at length naked, one-half or one-third the length of the flowers. Branches puberulous. *h.* 2ft. 1819. (B. M. 1212, under name of *S. pubescens.*)

S. lucens (shining). *fl.* yellow, five to seven lines long, pubescent; lobes ovate-oblong. June. *l.* imbricated, lanceolate or oblong, acuminate and acute, clasping, six to ten lines long, shining, ciliated, at length naked. Branches twiggy, pubescent above. *h.* 2ft. 1817.

S. ovata (ovate). *fl.* white or flesh-coloured, several times longer than the leaves; lobes ovate, acuminate. April. *l.* ovate or oblong, slightly acute, nearly flat, obsoletely one to three-nerved at back. *h.* 2ft. 1792. (A. B. R. 119; L. B. C. 141.)

S. striata (striated). *fl.* yellow, cano-pilose, scarcely longer than the leaves; lobes oblong, acute. July. *l.* ovate or oblong, sub-acute, flat, or the upper ones somewhat clasping, acute, striate-nerved, ciliated, glabrous. Branchlets pubescent. *h.* 2ft. 1820. (A. B. R. 113, under name of *S. imbricata.*)

S. tomentosa (tomentose). *fl.* yellow, cano-tomentose, ½in. long; lobes oblong, obtuse. August. *l.* imbricated, oval-oblong, rather obtuse, three to five lines long, three to five-nerved at back, slightly pilose; upper ones broader, half-clasping; lower ones flat, linear-lanceolate; young ones and branchlets densely cano-villous. *h.* 2ft. 1799. (A. B. R. 334.)

S. virgata (twiggy). *fl.* red; tube adpressedly pilose; lobes ovate, rather obtuse. June. *l.* opposite, three to six lines long, clustered, semi-spreading, linear or lanceolate-linear, obtuse, ciliated, or, as well as the branchlets, pubescent. *h.* 2ft. 1779. (A. B. R. 139, under name of *S. rubra*; A. B. R. 140, under name of *S. ciliata.*)

S. v. incana (hoary). *fl.* white; tube densely pubescent; limb glabrescent. *l.* ciliated, penicillate. Branchlets densely hoary or silky-villous at apex. (L. B. C. 11, under name of *S. incana.*)

STRUTHIOPTERIS. Included under **Onoclea** (which *see*).

STRUTHIUM. Included under *Gypsophila.*

STRYCHNINE-PLANT. The common name of *Strychnos Nux vomica.*

STRYCHNOS (an old Greek name used by Theophrastus for some solanaceous plants). SYNS. *Brehmia,*

Strychnos—*continued.*

Ignatia, Lasiostoma, Narda, Rouhamon, Unguacha. ORD. *Loganiaceæ.* A genus comprising nearly sixty species of stove, evergreen trees and shrubs, often tall climbers, broadly dispersed over the tropics. Flowers small or rather long, usually white, cymose, four or five-parted; corolla lobes valvate. Fruit baccate, mostly globose, indehiscent. Leaves opposite, three to five-nerved at or above the base, membranous or coriaceous. "The species of *Strychnos* contain in the bark of their root and in their seeds two alkaloids (strychnine and brucine), combined with a peculiar acid (igasuric acid)—properties which are extremely energetic; their action on the nervous system is most powerful, whether as invaluable medicines or as mortal poisons. . . . . The seeds of *S. Nux vomica* act as a powerful excitant of the spinal cord and nerves, and stimulate the functions of the organs of voluntary motion, in cases of paralysis which do not proceed from injury to the brain, for which the seed itself, or an extract, or its alkaloid, strychnine, are employed . . . . *S. Ignatia* yields the Ignatius Bean of India, used as a remedy for cholera. *S. potatorum* yields the celebrated Clearing Nut of India, which clarifies foul water when this is put in a vessel of which the inside has been rubbed with it" (Le Maoût and Decaisne). *S. colubrina*, a native of Malabar, furnishes one kind of *lignum colubrinum*, or Snakewood. The pulp of the fruit of several members of this genus is edible. The species, of which about half-a-dozen have been introduced to cultivation, are of no particular value from a garden standpoint.

STUARTIA (named in honour of John Stuart, Lord Bute, 1713-1792, a zealous patron of botany). Spelt *Stewartia* by a few authors. Including *Malachodendron.* ORD. *Ternströmiaceæ.* A genus comprising only three species of beautiful, hardy shrubs; two of which are North American and the third Japanese. Flowers large or mediocre, solitary in the axils, shortly pedunculate; sepals and petals five, rarely six, the latter imbricated and cohering towards the base; stamens numerous. Leaves membranous, deciduous. The species given below merit a place in every collection of ornamental shrubs. Although sufficiently hardy to bear our winters in the open air, yet the young shoots often become injured by very severe weather, the summer not being long enough to thoroughly ripen the wood or bring the flowers to perfection; it is therefore advisable to keep the plants in the conservatory or cool greenhouse, except in favoured spots in the South of England, &c. Peat soil, mixed with a little loam, is the most suitable compost. Propagation may be readily effected by layering; or by means of ripened cuttings, inserted in sand, under a hand glass.

S. grandiflora (large-flowered). A synonym of *S. pseudo-camellia.*

S. pentagyna (five-styled).* *fl.* cream-coloured, and, as well as the leaves, rather larger than in *S. virginica*; sepals and petals five or six, the latter obovate, with jagged edges; stamens longer than in *S. virginica.* May to July. *l.* oval, acute. *h.* 10ft. North America, 1785. (B. M. 3918.) SYN. *Malachodendron ovatum* (B. R. 1104).

S. pseudo-camellia (false Camellia). *fl.* creamy-white; sepals dull reddish-brown above, finely serrulate. Summer. *l.* oval-elliptic, shortly toothed, acuminate, narrowed at the base into the reddish petiole. Branches erect, flexuose. *h.* 12ft. Japan. SYN. *S. grandiflora* (R. H. 1879, 430).

S. virginica (Virginian).* *fl.* white; sepals ovate; petals five, round-obovate, 1in. long. April and May. *l.* oblong-ovate, serrulated, softly downy beneath. *h.* 8ft. North America, 1743. (G. C. ser. ii., viii. 433; A. B. R. 73, under name of *S. marylandica.*)

STUBWORT. An old name for *Oxalis Acetosella.*

STUPOSE. Tow-like; furnished with mats or tufts of long hairs.

STURMIA. A synonym of **Liparis** (which *see*).

STYLAGO. A synonym of **Strumaria** (which *see*).

STYLANDRA. A synonym of **Podostigma** (which *see*).

STYLE (from *stylos*, a column; in allusion to its form). The narrow portion of most carpels between the ovary and the stigma. Its use is to support the stigma in such a position as to favour pollination. The cells in its centre are very loosely arranged, and form what is called the "conducting tissue," for the passage of pollen tubes from the pollen grains on the stigma to the ovules in the interior of the ovary.

STYLIDIEÆ. A small natural order of herbs or rarely under-shrubs, chiefly Australian, a few species being found in tropical Asia, or in New Zealand and Antarctic America. Flowers hermaphrodite or very rarely unisexual, in terminal racemes or thyrsoid or corymbose panicles, rarely reduced to spikes or to single flowers, the primary inflorescence usually centripetal, the secondary often, or sometimes the whole, centrifugal; calyx tube adnate to the ovary, the limb of five divisions, all free or more or less united in two lips, the upper of three; corolla usually irregular, deeply divided into five lobes, of which one (the lowest), called the labellum, is much smaller than, or different from, the others, or rarely the corolla, as well as the calyx, regularly five or six-lobed; stamens two, the filaments connate with the style in a column free from the corolla. Capsule two-valved. Leaves radical or scattered, or collected in whorl-like tufts, entire, often narrow or small. The order embraces nearly 100 species; of these *Stylidium* absorbs eighty-four, and the remainder are classed under *Forstera*, *Levenhookia*, and *Phyllachne.*

STYLIDIUM (from *stylos*, a column; the stamens and styles are joined). SYNS. *Candollea* (of Labillardière), *Ventenatia* (of Smith). ORD. *Stylidieæ.* A genus of eighty-four species of beautiful but rare, greenhouse, herbaceous perennials, of which one is a native of the East Indies, and the rest are Australian (one being also dispersed over tropical Asia). Flowers in racemes, panicles, or corymbose cymes, on terminal peduncles or radical scapes; calyx lobes five, more or less united in two lips; corolla irregular, one of the lobes (labellum) much smaller and turned down, or rarely nearly as long and curved upwards, the other four ascending in pairs; column elongated and bent down or folded, elastic. Fruit a two-celled capsule, globose, linear, or lanceolate. The species best-known to cultivation are described below. They thrive in a compost of sandy loam and peat. Propagation may be effected by seeds, or, in a few cases, by division of the roots; the few shrubby kinds may be increased by cuttings.

S. adnatum (adhering). *fl.* pink, in nearly sessile clusters along the rachis; spike-like panicles or compound racemes dense, usually rather short and nearly sessile, but sometimes 6in. to 10in. long. July. *l.* scattered along the stem; upper ones crowded in a terminal, whorl-like tuft, linear, but sometimes all very narrow, in other specimens rather broad, and from ¼in. to 1½in. long. Stems 2in. to nearly 12in. long. 1824. (B. M. 3816 and B. R. 1459, under name of *S. fasciculatum.*)

S. a. abbreviatum (shortened). *fl.*, inflorescence rarely above 2in. long and very dense. *l.* narrow or broad. (B. M. 2598, and B. R. 914, under name of *S. adnatum.*)

S. armeria (Armeria-like). A synonym of *S. graminifolium.*

S. Brunonianum (Brown's). *fl.* pink; calyx lobes free; corolla with appendages to the throat; raceme loose, 2in. to 4in. long, many-flowered; scapes 1ft. to 1½ft. long, with two to five whorls of narrow leaves. June. *l.*, radical ones linear to oblanceolate, acute or rarely almost obtuse, 1in. to 2in. or more long, rather flaccid. 1841. (B. R. 1841, 15.)

S. bulbiferum macrocarpum (bulb-bearing, large-fruited).* *fl.* greenish-purple; calyx lobes free, very obtuse; corolla without appendages; scapes or pedicels ½in. to 2in. long, with a loose, almost corymbose raceme of three to seven flowers. May. *fr.* almost sessile, eight to nine lines long. *l.* very narrow-linear, scarcely acute, ¼in. to over ½in. long, densely tufted at the ends

Stylidium—*continued.*

and bases of the branches. *h.* 6in. 1840. (B. M. 3913, under name of *S. recurvum.*)

S. ciliatum (ciliated). *fl.* yellow or sometimes white or pink; corolla variable in size, the appendages small or wanting; panicle or raceme short and pyramidal or narrow and 3in. to 4in. long; scape 6in. to 12in. high. June. *l.* linear, 1in. to 1½in. long, terminating in a hair-like point. 1842. (B. M. 3883; B. M. 4529 and L. J. F. 34, under name of *S. saxifragoides.*)

S. dichotomum (dichotomous). *fl.* yellow, in a more or less thyrsoid panicle or compound raceme; scapes 2in. to 4in. high, glandular-pubescent. April. *l.* crowded at the bases and ends of the branches, and scattered between the tufts, sometimes 1in. or more long, narrow-linear, acute. 1850. (B. M. 4538, F. d. S. 606, and L. J. F. 59, under name of *S. mucronifolium*; F. d. S. 229, under name of *S. Hookeri.*)

S. graminifolium (Grass-leaved).* Grass-leaved Trigger Plant. *fl.* pink, nearly sessile or shortly pedicellate; corolla lobes nearly equal, the lip rather long; scapes 6in. to 18in. high, bearing a narrow, simple raceme or interrupted spike. July. *l.* linear, rather rigid, acute or obtuse, nearly flat, variable in breadth, 2in. to 6in. or even 9in. long, sometimes cartilaginously denticulated on the margins. 1803. (B. M. 1918; B. R. 90.) *S. armeria* (L. J. F. 286) is a form with broad leaves.

S. hirsutum (hairy). *fl.* pink or red, nearly sessile, forming a dense, oblong, spike-like raceme, rarely above 1in. long, very hairy; larger corolla lobes nearly equal; lip with crisped margins and usually short appendages; scapes 6in. to over 12in. high, with spreading hairs. June. *l.* narrow-linear, acutely acuminate, 2in. to 6in. or 8in. long, glabrous or glandular-pubescent. 1830. (B. M. 3194.)

S. Hookeri (Hooker's). A synonym of *S. dichotomum.*

S. laricifolium (Larch-leaved). *fl.* pink; corolla with appendages to the lip, but usually none to the throat; panicle or raceme loose, pedunculate, often above 6in. long. July. *l.* scattered but rather crowded along the branches, not collected in terminal tufts, narrow-linear, mucronate, ¼in. to 1in. long. *h.* 1ft. 1818. Sub-shrub. (B. R. 550; H. E. F. 32; B. M. 2249, under name of *S. ternifolium.*)

S. mucronifolium (mucronate-leaved). A synonym of *S. dichotomum.*

S. reduplicatum (reduplicate). *fl.* yellowish-white or pale pink, the lower ones on long pedicels; two larger corolla lobes ½in. to ¾in. long, connate to the middle; raceme short, loose; scapes leafless, 6in. to 1½ft. long, with spreading hairs. November. *l.* all radical, linear, acuminate, narrowed into long petioles, broad and nearly flat to narrow with revolute margins, 3in. or 4in. to nearly 12in. long, glabrous or minutely glandular-pubescent. 1841. (B. 213, under name of *S. Drummondii*; B. R. 1842, 41, under name of *S. pilosum.*)

S. saxifragoides (Saxifrage-like). A synonym of *S. ciliatum.*

S. scandens (climbing). *fl.* pink; corolla with more or less prominent appendages to the throat and lip; racemes terminal, solitary or two or three together, shortly pedunculate. June. *l.* all collected in dense, whorl-like, distant tufts, linear, 1in. to 2in. or more long. *h.* 2ft. 1803. Climber. (B. M. 3136; P. M. B. xv. p. 149.)

S. spathulatum (spathulate).* *fl.* pale yellow, small; corolla with appendages to both throat and lip; racemes loose, simple, elongated; scapes glabrous or pubescent, sometimes 1½ft. high. Summer. *l.* radical, rosulate, obovate to oblong-spathulate, obtuse or acute, more or less pubescent or sprinkled with glandular hairs on both sides, ½in. to 1½in. long, including the petiole. *h.* 6in. 1872. (B. M. 5953.)

STYLIDIUM (of Loureiro). A synonym of **Marlea** (which *see*).

STYLIFEROUS. Style-bearing.

STYLIFORM. Style-shaped.

STYLIMNUS. A synonym of **Pluchea** (which *see*).

STYLIS. A synonym of **Marlea** (which *see*).

STYLOCORYNE (of Cavanilles). A synonym of **Randia** (which *see*).

STYLOCORYNE (of Wight and Arnott). A synonym of **Webera** (which *see*).

STYLOGLOSSUM. A synonym of **Calanthe** (which *see*).

STYLOLEPIS. Included under **Podolepis.**

STYLOPHORUM (from *stylos*, a style, and *phero*, I bear; indicating one of the distinctive characters). ORD. *Papaveraceæ.* A genus comprising three species of hardy herbs (nearly allied to *Chelidonium*, from which they principally differ in habit), with perennial rhizomes and yellow juice; one is North American, a second is Himalayan, and the third is found in Mandschuria and

Stylophorum—*continued.*

Japan. Flowers yellow or red; sepals two; petals four; stamens numerous; peduncles elongated, solitary or subfasciculate, at length nodding. Radical leaves pinnatifid or absent; cauline ones few, alternate, or the floral ones nearly opposite, lobed or dissected. Two species have been introduced to this country. They thrive in any light garden soil. Propagation may be effected by seeds, sown in the open border, during April; or by divisions of the root.

S. diphyllum (two-leaved).* Celandine Poppy. *fl.* deep yellow, 2in. broad; peduncles equalling the petioles. May. *l.* pale or glaucous beneath, smoothish, deeply pinnatifid into five or seven oblong, sinuate-lobed divisions; radical leaves often with a pair of smaller and distinct leaflets. *h.* 1ft. North-west America, 1854. The foliage and flower resemble Celandine. (B. M. 4867.) SYN. *S. ohioense.*

S. japonicum (Japanese). *fl.* yellow, axillary, Poppy-like. May. *l.*, radical ones long-stalked, pinnatisect. Stem slender, 1ft. to 1½ft. high, two or three-leaved. Japan and North-eastern Asia, 1870. An elegant plant. (B. M. 5830.) SYN. *Chelidonium japonicum.*

S. ohioense (Ohio). A synonym of *S. diphyllum.*

STYLOPODIUM. A term applied to an enlargement of a disk-like expansion at the base of a style, as in *Umbelliferæ.*

STYLOSANTHES (from *stylos*, a style, and *anthos*, a flower; alluding to the very long style). Pencil Flower. ORD. *Leguminosæ.* A genus comprising about fifteen species of stove or greenhouse, perennial herbs, natives of Asia, Africa, North America, and Brazil. Flowers yellow (or white?), variously disposed; calyx tube filiform, with membranous lobes; petals and stamens inserted at the apex of the tube; standard orbicular. Leaves pinnately trifoliolate, exstipellate; stipules adnate to the bases of the petioles. Several of the species have been introduced, but they are scarcely worthy of cultivation, except in botanical collections.

STYLURUS. Included under **Grevillea** (which *see*).

STYPANDRA (from *stype*, tow, and *aner*, *andros*, an anther; alluding to the downy appearance of the stamens). ORD. *Liliaceæ.* A small genus (three species) of greenhouse half-hardy, perennial herbs, with fibrous roots, natives of Australia. Flowers blue, in a very loose, terminal, dichotomous cyme; perianth at length deciduous, of six spreading segments, all equal or the inner ones broader; stamens six; pedicels filiform; bracts minute or none, or the lower ones leaf-like in the leafy species. Leaves either all radical or distichously spreading on the stem. Stem erect or ascending, sometimes woody at base. The species will succeed in an unheated pit or warm border outside, if protected in severe weather. A compost of sandy loam and peat is suited to their requirements. Increased by divisions.

S. cæspitosa (tufted). *fl.* on erect pedicels, 1in. to 2in. long, usually three or four in an umbel; perianth blue or yellowish inside, or rarely white, erect, the segments nearly ½in. long. June. *l.* mostly radical, with very short, distichous sheaths, erect, rigid, 6in. to 12in. long, ⅛in. to ¼in. broad. Stems erect, 1ft. to 2ft. high. 1824.

S. glauca (glaucous). *fl.* in a loose cyme, usually leafy at base; perianth blue, the segments very acute, about ½in. long; pedicels recurved, ½in. to 1in. long, mostly solitary. June. *l.* distichous, the sheaths usually concealing the stem, erect or spreading, linear or lanceolate, usually 3in. to 4in., but sometimes 6in. to 8in. long, two to four lines broad. Stems low or ascending, 1ft. to 3ft. high. 1823. (B. M. 3417, under name of *S. propinqua.*)

S. umbellata (umbellate). *fl.*, perianth segments white or yellowish, about five lines long. June. *l.*, radical ones numerous, 5in. to 8in. long, one to two lines broad. Stems 8in. to 10in. high, including the inflorescence, which is often reduced to a single umbel of two to four flowers on a simple scape. 1826. Very nearly allied to *S. cæspitosa.*

STYPHELIA (from *styphelos*, hard; alluding to the habit of the species). ORD. *Epacrideæ.* A genus comprising eleven species of beautiful, greenhouse, evergreen, erect or decumbent shrubs, confined to Australia.

Styphelia—*continued.*

Flowers axillary, solitary with the rudiment of a second, or very rarely two or three, on a very short peduncle; calyx usually coloured, five-parted, many-bracted, bibracteolate; corolla tube elongated, cylindrical or slightly ventricose, hairy inside at the throat; lobes five, linear, much revolute; stamens five, free. Leaves sessile or scarcely petiolate, small or elongated, acuminate, striate-nerved. The four best-known species are here described. Young plants are obtained from cuttings, in a similar way to Ericas; but, as the process takes a long time, it is advisable to purchase small plants from nurserymen. A compost of fibry peat, with the addition of about one-sixth of silver sand, is most suitable for these plants. Efficient drainage must be secured, and the new soil made firm round the ball, which should not be broken, nor the roots disturbed by the process. Water should be withheld from the roots for a few days, light overhead syringings being sufficient. As the plants progress, more air and sun should be admitted, until about the end of July, when they may be plunged in ashes outside. Watering should be carefully performed at all times. A cool greenhouse, or other structure where frost is excluded, is a suitable position for them in winter.

S. amplexicaulis (stem-clasping). A synonym of *Leucopogon amplexicaulis.*

S. longifolia (long-leaved). *fl.* green, solitary, axillary, nearly sessile; corolla tube nearly 1in. long, with five dense tufts of hairs above the base. June. *l.* long-lanceolate, gradually tapering into a fine, rigid point, concave, 1in. to 2in. long, or the lower ones still longer. Branches twiggy, softly pubescent. *h.* 3ft. 1807. (B. R. 24; L. B. C. 1583.)

S. triflora (three-flowered). *fl.* pale pink and yellow, very shortly pedicellate, solitary or very rarely two (or three?) together in the lower axils; corolla tube usually about ¾in. long. July. *l.* obovate-oblong to oblong-lanceolate, very shortly tapering to a rigid point, flat or more or less concave, rarely exceeding 1in. in length. *h.* 5ft. 1796. (A. B. R. 72; B. M. 1297; L. B. C. 426.)

S. tubiflora (tube-flowered).* *fl.* red, solitary in the axils, nearly sessile or shortly pedicellate; corolla tube nearly 1in. long, the revolute lobes very long and narrow. July. *l.* oblong-linear, sometimes slightly cuneate, abruptly mucronate, with revolute margins, about ½in. long. *h.* 5ft. 1802. (B. 142; L. B. C. 1938; P. M. B. xii. 29.)

S. viridis (green). *fl.* green, solitary in the axils, nearly sessile; corolla tube nearly ¾in. long, with five tufts of hairs inside above the base. May. *l.* oblong-lanceolate or obovate-oblong, abruptly narrowed into a short, rigid point, flat or slightly convex, less than 1in. long. *h.* 4ft. 1791. (A. B. R. 312; S. F. A. 50, under name of *S. viridiflora.*)

STYPHNOLOBIUM. Included under **Sophora** (which *see*).

STYRACEÆ. A natural order of trees or shrubs, mostly natives of the warmer parts of Asia, Australia, and America, a few being found in Northern temperate regions. Flowers usually white, rarely reddish, regular, hermaphrodite or rarely polygamo-dicœcious, usually racemose; calyx gamosepalous, with five, rarely four, teeth or lobes; corolla of five, rarely four, petals, free or connate towards the base; stamens as many, or twice as many, as the corolla lobes, sometimes indefinite; disk wanting; bracts small, often minute or obsolete; pedicels ebracteolate. Fruit often baccate or drupaceous, one-seeded by abortion. Leaves alternate, exstipulate (or with minute rudimentary stipules?), entire or serrated, membranous or coriaceous, penniveined. The two balsams, Storax and Benzoin, are respectively derived from *Styrax officinalis* and *S. Benzoin.* Several of the species are employed as tea and for dyeing yellow in the Himalayas. The order embraces seven genera and about 220 species. *Styrax* and *Symplocos* are the principal genera, and include all the species, except about a dozen.

STYRANDRA. A synonym of **Maianthemum** (which *see*).

STYRAX (the ancient Greek name, used by Theophrastus, for the tree which produces Storax). Storax.

Styrax—*continued.*

SYNS. *Cyrta, Foveolaria, Strigilia, Tremanthus.* ORD. *Styraceæ.* A genus comprising nearly sixty species of greenhouse or hardy, mostly lepidote, trees and shrubs, natives of the warmer parts of Asia and America, a few being found in temperate Asia and Europe. Flowers often white, disposed in axillary and terminal, short, loose, simple or slightly-branched racemes, often pendulous; calyx campanulate, minutely five-toothed or nearly entire; corolla segments or petals five, erecto-patent; stamens ten. Fruit globose or oblong; seeds, by abortion, one, or very rarely two. Leaves entire or serrated. *S. Benzoin* yields the resin called Benzoin; and *S. officinale* furnishes a balsamic resinous substance, known as Storax. The few species introduced are (except where otherwise stated) hardy, deciduous, white-flowered shrubs; they are very handsome subjects when in flower, and hence are highly suited for shrubberies. A light soil is most suitable. Propagation may be effected by layers, in spring or autumn.

S. americana (American). *fl.* solitary or in very few-flowered racemes, nodding; petals lanceolate-oblong, ½in. to nearly ¾in. long. Summer. *l.* 1in. to 3in. long, bright green, commonly entire, oblong or oval, mostly acute at both ends, often acuminate. *h.* 4ft. to 8ft. North America.

S. Benzoin (Benzoin). *fl.* ½in. long; pedicels thrice as long as the flowers; racemes compound, axillary, rather shorter than the leaves, hoary-tomentose. Summer. *fr.* globose, indehiscent, seven lines broad. *l.* 4in. long, oblong, acuminate, white-tomentose beneath. Branchlets covered with rusty-white tomentum. Sumatra. Stove. (B. M. Pl. 169.)

S. californica (Californian). *fl.*, pedicels with the calyx and corolla minutely canescent; style becoming 1in. long. *fr.* a bony seed, the size of a small cherry. *l.* oval, entire or sparingly undulate, 1in. to 2in. long, short-petioled. *h.* 5ft. to 8ft. California. A shrub with scurfy, stellular pubescence, at first hoary, sometimes soon green and glabrate.

S. grandifolia (large-leaved).* *fl.* mostly in elongated racemes; corolla ½in. long, convolute-imbricate in bud. Spring. *l.* obovate, acute or pointed, 3in. to 6in. long, white-tomentose beneath. *h.* 6ft. North America, 1765. (L. B. C. 1016.)

S. japonica (Japanese). A form of *S. serrulata virgata.*

S. officinalis (officinal). *fl.*, corolla often six or seven-parted; racemes shorter than the leaves, three to five-flowered. July. *l.* oval-obovate, 1½in. to 2in. long, often rounded at apex, subacute at base, hoary-tomentose beneath. *h.* 10ft. Levant (naturalised in South-western Europe), 1597. (A. B. R. 631; Fl. Ment. 60; L. B. C. 928.)

S. pulverulenta (powdery). *fl.* ½in. long, one to three together in the axils and at the tips of the branches, fragrant. Spring. *l.* oval or obovate, about 1in. long, sparingly puberulous above, scurfy-tomentose beneath. *h.* 1ft. to 4ft. South United States, 1794.

S. serrulata (slightly serrated).* *fl.*, corolla five or six-lobed, pubescent; racemes terminating the lateral branches, shorter than the leaves. Spring. *l.* oblong, acuminate, 2½in. long, acute at base, serrulated, glabrescent. Branches, petioles, racemes, and calyces fulvous-tomentose. India to Japan. A shrub or tree, sometimes 40ft. high. (B. M. 5950.)

S. s. virgata (twiggy). *l.* tapering, acuminate, usually widest below the middle. *S. japonica* (R. G. 583; S. Z. F. J. 23) only differs from this variety in having somewhat pinkish-tinted buds, with a glabrescent calyx.

SUÆDA (from *Suaed*, said to be the Arabic name of one of the species). ORD. *Chenopodiaceæ.* A genus comprising about forty species of saline herbs or shrubs, widely distributed. Flowers small or minute, axillary or clustered. Leaves ternate, fleshy, entire. *S. fruticosa* and *S. maritima* (Sea Blite; Seaside Goosefoot, &c.) are British plants; the latter is used in Southern Europe in the manufacture of Barilla (*see* remarks under **Salicornia**). None of the species possess any horticultural merit.

SUB. A prefix which, in composition of Latin words in terminology, signifies nearly, somewhat, or slightly: *e.g.*, Sub-rotund, roundish; Sub-cordate, slightly cordate, &c.

SUBEROSE. Corky in texture.

SUBLIMIA. A synonym of *Hyophorbe.*

SUBMERGED, SUBMERSED. Growing under water.

SUB-PETIOLAR. Beneath the petiole.

SUBSOIL. The layer of soil existing at such a depth below the surface that it is not reached in the usual operations of gardening and agriculture, *i.e.*, from about 1ft. below the surface downwards. In some localities, the Subsoil is of almost the same composition as the soil; but there is usually a considerable difference between them. Nor is it difficult to understand why this should be the case, in so far, at least, as regards the proportion of organic matter, and of the soluble foods of plants, in each; for plants draw a large share of their nourishment from the surface soil, and thus impoverish it of the substances used by them. On the other hand, such plants as die and decay on any piece of ground increase the proportion of organic matter in the surface soil, but add little, if any, to the Subsoil. The physical texture of the surface soil is also rendered more open by the numerous roots that traverse it; and this greater looseness is much increased by the operations of cultivation. The freer access of air and rain thus afforded permits a more rapid decomposition of the soil. The looser texture also permits rain-water to trickle down till it reaches the Subsoil, carrying with it soluble compounds out of the surface soil. If the Subsoil is clay, it retains what is carried down in this way, whether such additions are useful as food for plants, or poisonous to them. Hence, the Subsoil may become rich, so as to yield excellent crops when exposed to air and light; or it may be almost barren until the poisonous substances in it (*e.g.*, Oxides of Iron) have been changed, by the action of natural agents, such as air and rain, or by the operations of agriculture, into harmless compounds.

The nature of the Subsoil exercises a very important influence on the fertility of the surface soil. If it is open and sandy, it allows the rain-water to drain away rapidly; hence, there is no reserve, in times of drought, to supply the place of that evaporated from the surface of the soil, and from the plants thereon, which suffer in their growth, or perish for lack of water. If, on the other hand, the Subsoil is clay impervious to water, the rain is caught, and collects in hollows, where it stagnates, with the usual ill-consequences of the surface soil becoming saturated and cold, and being rendered sour by the formation in it of organic acids, from the action of the water on decaying plant-remains. Clay Subsoils must, therefore, be broken up by the Subsoil plough, or by the spade and fork; but they should be well drained about one or two years before they are broken up, as *wet* clay coheres very quickly if merely cut through. Excellent results often follow the bringing of the Subsoil to the surface, by means of Subsoil ploughs or spades; and it is evident, from what is said above, that it must be an advantage to bring within reach of the roots of plants new soil, richly supplied with substances required by them, and that have been used up, to some extent, in the surface soil. Moreover, the new soil, when exposed to the atmosphere and frost, breaks up, and affords new food supplies, in addition to those washed into it by rain from the higher layers.

Where the Subsoil contains poisonous substances, it should not be disturbed, unless it is possible to let the ground lie fallow for a year or more. In this time, the danger will probably be removed by the action of the atmosphere upon the hurtful substances. To ascertain whether the Subsoil is hurtful, the following method has been employed: A flower-pot is filled with the Subsoil to be tried, and another is filled with ordinary soil, for comparison of results. Seed of the same kind is sown in both, and, if the Subsoil gives a good crop, this shows it to be safe, and worth bringing to the surface; but, if the crop is sickly and weak in the Subsoil, while good in the other pot, the Subsoil is evidently unwholesome in its natural state, though it may be rendered fertile by exposure, for a time, on the surface.

Subsoil—*continued.*

SUB-SPECIES. A rank higher than that of Variety, but lower than that of Species.

SUB-TROPICAL GARDEN. A term applied to a portion of a flower garden or pleasure-ground devoted, during summer, to stately-habited foliage plants, which are arranged with a view to represent tropical vegetation. Many of the plants used are natives of tropical countries, and are, consequently, only available for placing outside during the hottest part of the year; but there are others of stately aspect which are quite hardy, and are invaluable for associating with them. Tropical plants of slow growth, which have to be kept under glass all the winter, require a great deal more space than can generally be afforded them; and as they are also very expensive subjects to procure in the first place, comparatively few gardeners have any at their command. One of the most important provisions for sub-tropical plants is shelter; their leaves in most instances are soon torn, and the plants disfigured, if exposed to rough winds. Shade and moisture are also necessary for many Tree and other Ferns and Cycads. There are numerous sub-tropical plants which may readily be raised from seed each spring, as they are quick-growing, and form quite large specimens before autumn, when planted out about the middle of June, in rich soil. Of these *Albizzia lophantha*, Castor-oil plants (*Ricinus*) in variety, Nicotianas, Solanums, Wigandias, and varieties of *Zea* are specially valuable. Cannas, too, may readily be raised from seeds in spring; but the plants are nearly hardy, and may afterwards be increased by division of the rootstock in spring. Of tropical plants the most serviceable are: amongst Palms —*Chamærops humilis*, *Livistona australis*, *L. chinensis*, *Phœnix dactylifera*, *Ptychosperma Cunninghamiana* (often known in gardens as *Seaforthia elegans*), *Trachycarpus excelsus* and *T. Fortunei*. Musas—*M. Ensete* and *M. superba*. Tree Ferns—*Alsophila australis* and *A. excelsa*, *Cyathea dealbata*, *Dicksonia antarctica*. *Cycas circinalis* and *C. revoluta* may be plunged in sheltered positions along with the plants above-mentioned. Amongst other subjects also available are Arundinarias, Bambusas, Centaureas, Cordylines, Erythrinas, Fatsias, three or four species of *Ficus*, Funkias, the New Zealand Flax (*Phormium tenax*), Pampas Grass, &c. Other remarks on this subject will be found under **Garden**, and the descriptions and culture of plants referred to are given under their respective headings.

SUBULARIA (from *subula*, an awl; alluding to the form of the leaves). Awlwort. ORD. *Cruciferæ*. A monotypic genus. The species, *S. aquatica*, is an annual, aquatic herb, indigenous in Europe (Britain), Siberia and North America. It has no value as a garden subject.

SUBULATE, SUBULIFORM. Awl-shaped.

SUCCISA. Included under *Cephalaria* and *Scabiosa*.

SUCCISE. Abruptly cut or broken off at the lower end.

SUCCORY. Another name for **Chicory** (which *see*).

SUCCOVIA (named after Professor Geo. Suckow 1751-1813, a botanist of Heidelberg). ORD. *Cruciferæ*. A monotypic genus. The species, *S. balearica*, an annual, with yellow flowers and pinnatisect leaves, native of the Canary Islands and the Mediterranean region, is probably not now in cultivation.

SUCCUBOUS. When, in leaves crowded on a stem, the base of each leaf covers the apex of the next below.

SUCCULENT. Very cellular and juicy.

SUCCULENT PLANTS. Amongst these are included numerous genera of plants which are extremely varied in habit, but mostly all have leaves of a soft, succulent nature. Very few are hardy subjects compared with those which need glass protection: still, a large number require but little artificial warmth. The natural order *Cacteæ* includes a large proportion of Succulent Plants, many being exceedingly curious, and others very beautiful. The following are representative genera amongst Succulents: *Agave, Aloe, Cereus, Cotyledon, Crassula, Echinocactus, Epiphyllum, Gasteria, Haworthia, Mammillaria, Mesembryanthemum, Opuntia, Phyllocactus, Sedum, Sempervivum.* For carpet-bedding purposes, some of the dwarf Succulents are invaluable—as, for example, Sedums, &c.

SUCCUTA. A synonym of *Cuscuta.*

SUCKER. A shoot of underground origin.

SUCKERING IRON. A garden tool used for removing suckers from fruit-trees, &c. It consists of a narrow, steeled blade, to which a shank and socket are attached, wherein to insert a handle somewhat like that of a spade. The entire length is about the same as that of the latter implement, but the blade is usually only 6in. long by 3in. broad, at the cutting edge. The handle is much shorter, and the shank and socket, combined, longer.

SUCKERS, PROPAGATION BY. *See* **Propagation.**

SUFFRUTESCENT. Slightly shrubby.

SUFFRUTICOSE. Low and shrubby at base.

SUGAR BERRY. The fruit of *Celtis occidentalis.*

SUGAR BUSH. A common name for **Protea mellifera** (which *see*).

SUGAR CANE. The popular name for **Saccharum officinarum** (which *see*).

SUGAR PEA. A name given to edible-podded Peas. *See* **Pea.**

SUGAR PINE. *See* **Pinus Lambertiana.**

SUKANA. A synonym of *Celosia.*

SULCATE. Furrowed or grooved.

SULPHUR. An element constantly present in protoplasm, though only in a very small amount. It is believed to be essential to living beings, and is supposed to be taken by plants from the soil, in Sulphate of Calcium, absorbed in solution by the roots. The sulphate is probably broken up on contact with the oxalates that are formed during growth, and the Sulphur is built up into organic compounds of the protoplasm group. The use of Sulphur to plants is, however, uncertain.

Sulphur as a Remedy. Sulphur is a very useful remedy against the attacks of the Mildew Fungi (*see* **Mildew** and **Oidium**) that live on the surface of the green parts of plants. It is used in the form of "Flowers of Sulphur," dusted upon both surfaces of the leaves, and of young shoots, by means of a **Sulphurator** (which *see*). The operation should be performed while the plants are still wet with dew. In this way, Sulphur is applied to Roses, Hops, Vines, &c., usually twice or thrice in a season; but it must be done at such periods as will permit of the Sulphur being all washed off any part that is afterwards to be made use of in food (*e.g.*, Grapes or Hop catkins), before they are gathered. The Sulphur destroys the mycelium of such external Fungi. Weak solutions of Potassium Sulphide have been found to act equally as well as the powder, and are now coming into general use. Dusting with Flowers of Sulphur is a remedy also sometimes employed against larvæ of Sawflies, and of Moths; and both the powder and solutions of Potassium Sulphide are used to destroy

Sulphur—*continued.*

Green Fly and Red Spider. For the latter, the modes of treatment recommended are to syringe the plants, and then to scrub as vigorously as may be permitted, or to dip the shoots into the solution, which is prepared by carefully mixing 4oz. of Sulphide of Calcium with 2oz. of soft soap, and then adding hot water up to one gallon in all. This solution should be made use of twice or thrice, and will be found a most useful application; or fluids containing Sulphur, *e.g.*, Gishurst Compound and Veitch's Chelsea Blight Composition, may be employed with success.

SULPHURATOR. An apparatus or appliance for distributing Flowers of Sulphur over plants attacked by Mildew, &c. It consists of a small bellows with a small tin box above the tube, having holes in the bottom. The sulphur is placed in this box, and as it shakes through into the tube it is expelled, wherever desired, by the action of the bellows.

SULPHURIC ACID, or **OIL OF VITRIOL.** In horticulture, this substance is of little use; for, though weak solutions (one part in fifty of water) have been used for syringing plants to destroy insect pests, it can be employed with safety only for hardy subjects; and there are various solutions preferable for use in this way. Sulphuric Acid is largely used in the preparation of soluble phosphates for manure. The sulphates, or compounds of Sulphuric Acid, are of considerable value. Solutions of Sulphate of Copper (Blue Vitriol) and of Sulphate of Soda are employed as washes for seeds of Oats, Barley, and other Cereals, to cleanse them from spores of the Smut Fungus (*Ustilago segetum*), and also against Bunt (*Tilletia caries*) in Wheat and in Barley. In like manner, Sulphate of Copper solution (one ounce to a gallon of water) is a valuable insecticide when syringed on plants.

Sulphates are often used as manures. Sulphate of Ammonia, prepared from gas-liquor, by the addition of Sulphuric Acid to it, or to the Ammonia that is removed from the liquor when steam is forced through it, has been found to add largely to crops when given as manure. It supplies Nitrogen in a form readily taken up by plants; but the amount should not exceed 1cwt. per acre. In the South of England, Sulphate of Lime, or Gypsum, is frequently used, in quantities of from 2cwt. to 10cwt. per acre, for Beans, Peas, and other leguminous plants, for which it is especially valuable, and with which it gives excellent results. In Germany, it is used for pastures, and also, to a less amount, for other produce. It is mostly burned and reduced to powder before being applied.

SUMACH. *See* **Rhus.**

SUMACH, MYRTLE-LEAVED. A common name for *Coriaria myrtifolia.*

SUMMER BEDDING. Most people are acquainted with this term, which applies to the planting of flower beds annually for a display through the summer and early autumn. It is usually carried out at the latter part of May and through June, the seasons varying a little according to locality. In Summer Bedding, Pelargoniums play the most conspicuous part; Alternantheras, Calceolarias, Coleus, Heliotropes, Iresines, Lobelias, Pyrethrum (Golden Feather), Verbenas, &c., are also largely employed. *See also* **Bedding-out.**

SUMMER SNOWFLAKE. *See* **Leucoium æstivum.**

SUN-BURNING. A term applied to injuries of various parts of plants, attributed, with more or less reason, to exposure to the rays of the sun in confined spaces, or where the heat is concentrated through glass or water, or by reflection from walls or other objects. Probably, both heat-rays and light-rays are concerned in

Sun-burning—*continued.*

the result; but it is impossible to determine the share due to each. A very rapid rise of temperature, after severe cold, is also apt to produce results included under the general name of Sun-burning.

Most plants, if exposed for some time to a temperature between 105deg. and 125deg. Fahr., are killed; but certain fleshy subjects, particularly species from tropical deserts, are able to resist even a higher temperature than 125deg. When plants that have been in a greenhouse all the winter are first put out of doors, in spring, the leaves often become brown and look scorched. These organs may die and wither, or may only become red or brown, and afterwards reassume their natural green colour. Plants do not usually suffer serious injury from this cause, though often checked in their growth for a time.

In ill-ventilated glasshouses, it often occurs that the leaves of many of the plants show round, pale, withered spots. Observation teaches that these follow the presence on the leaves, during sunshine, of drops of water; and it has been suggested that the drops act like miniature burning-glasses, focussing the rays upon the spots below them, and destroying the protoplasm by the excess of light and heat so caused. Inequalities in the glass of greenhouses are believed to give rise to similar injuries. Whatever may be the cause, experience has proved that thorough ventilation is the best preventive, and that, if this is attended to, the evil will be much diminished, if not wholly cured.

Sun-burning and *Sunstroke* are terms applied to injuries of the stems of trees, consisting sometimes in the bark dying, and separating from considerable surfaces, or in long strips, on the side most exposed to the sun's rays. Sunstroke is apt to occur in trees exposed by the removal of others or of undergrowth, or it may follow the erection of walls or other reflectors of heat in the immediate neighbourhood of the stems. It injures both fruit-trees (especially Peaches) and forest-trees when suddenly exposed. The cause of injury is the death of the newly-formed cells of the cambium layer by exposure to excessive heat. In trees suddenly exposed to variations in temperature greater than they had previously to bear, the bark is not sufficiently developed to protect the cambium from injury, and the result is as just described.

Splitting of the bark is apt to occur in spring, when trees have been exposed for some time to keen frost, followed by a sudden rise of temperature. The injury is due to unequal expansion of the bark and the wood. Probably, it is more often caused by the preceding frost than by the warmth, the thaw only bringing to view the harm already done. But that Splitting is, to some extent, connected with the sun's warmth is shown by its greater frequency on the side of the trunk that receives most of the sun's rays. Both Sun-burning and Splitting are far commoner on the Continent than in Britain, where the extremes of heat and cold are seldom such as to give rise to either. The best preventive of both is to protect the trunks and branches that may be in danger, by some simple means of shelter, such as wrapping them in straw, or coiling a straw-rope around them.

A few years ago, Dr. H. Müller, of Thurgau, called attention to the loss of grapes that occurs in various places in Germany when cold, damp weather is suddenly followed by bright, warm, sunny days. In the unripe clusters that are exposed to the direct rays of the sun, many of the grapes become pale, and then shrivel and turn brown. Sometimes, the stalks of the clusters turn brown before the grapes show signs of injury, but the latter soon shrivel and die when the stalks are killed. Experiments show that the cause of injury is excessive heat, and that similar results follow

Sun-burning—*continued.*

when clusters are exposed to artificial heat as great as that to which they are subjected under natural conditions, *i.e.*, between 105deg. and 115deg. Fahr. The risk of injury is greater in proportion as the fruit is more juicy. The moister the atmosphere, the less must be the evaporation from the fruit; hence, in moist weather, evaporation cannot act as a means of keeping down the temperature, and this probably explains how the harm done is greater after a continuance of wet weather, as the air is then nearly saturated with moisture. The risk is much less in England than in Germany, as the temperature is seldom so high in our islands as to do injury. Prevention may be secured by any method of shading the clusters. The best protection is that afforded by the leaves of the Vines themselves; hence, the removal of the leaves to hasten ripening is seldom to be recommended.

Though not strictly included under Sun-burning, a few remarks may be added on the harm done by dry, windy weather to many plants that grow in moist soil. If exposed for some days to dry, warm winds, the leaves of such plants wither and die, becoming so brittle as to crumble into dust when rubbed in the hand. Under similar conditions, the same species of plants growing in drier ground may scarcely be injured. The cause is as follows: The damper the localities in which plants grow, the more are all their green parts adapted for rapid evaporation. While the evaporation is balanced by the amount of water absorbed by the roots, and carried up by the stems, growth goes on rapidly, and the plants grow luxuriantly, unless the mineral matters absorbed with the water accumulate to a hurtful degree, when the plant will become weak and sickly. But in dry, warm weather, the loss by evaporation exceeds the amount that can be supplied to the leaves; hence, they wither, and dry up. Those that suffer most are the mature leaves in the active discharge of their functions, the older and younger ones being far less severely injured. The only remedial means applicable is to shelter the choicer plants from wind and sunshine as much as possible, and to syringe their leaves occasionally. Watering the soil is of no use, as it is already too moist. On such ground, drainage is the most efficient means of preventing injury to the plants from drought.

SUNDEW. *See* **Drosera.**

SUNDROPS. A name applied to *Œnothera fruticosa.*

SUNFLOWER. A popular name for the species and varieties of *Helianthus*, but more particularly applied to the varieties of *H. annuus*, which may readily be raised from seed each year. Sunflowers are best adapted for planting at the back of large shrubbery borders or in wild gardens.

SUNIPIA (said to be the native name in Nepaul). ORD. *Orchideæ.* A monotypic genus. The species—a stove, epiphytal Orchid, with small, racemose flowers, lateral, elongated, leafless scapes, and a coriaceous, slender, many-veined leaf—is a native of Java, and awaits introduction to this country.

SUN-PLANT. A popular name for *Portulaca grandiflora* and other species.

SUN ROSE. *See* **Helianthemum.**

SUPERIOR. Growing above anything. The posterior or upper lip of a corolla is the Superior. "A calyx is Half-superior when it appears to grow from above the base of an ovary, and absolutely Superior when it appears to grow from the top of the ovary. On the contrary, the ovary is Superior when it grows above the origin of the calyx" (Lindley).

SUPERPOSED. Stationed vertically above some other part.

SUPERVOLUTE. When one edge is rolled inwards, and is enveloped by the opposite edge also rolled inwards: *e.g.*, the leaves of an Apricot-tree.

SUPINE. Lying flat, with face upwards.

SUPPRESSION. Complete abortion.

SUPRA. A term which, used in Latin compounds, signifies above; *e.g.*, Supra-axillary, growing above an axil; Supra-foliaceous, growing above a leaf.

SUPRA-DECOMPOUND. Many times compound: *e.g.*, the leaves of Carrot, Fennel, &c.

SURCULOSE. Producing suckers.

SURCULUS. A sucker; a shoot rising from underground.

SURFACE CATERPILLARS, or **SURFACE GRUBS.** The larvæ of several species of Moths, chiefly *Triphæna pronuba*, *Agrotis segetum*, and *A. exclamationis*. The name is given to these larvæ because of their habit of living just below the surface of the soil during the day, coming out to feed at night on low plants and herbs. They are much in the habit of gnawing through the stems of herbaceous plants below the soil, just where the stems join the roots, and thus cause the plants to wither without any evident reason. In winter, they also frequently eat their way into fleshy tubers (potatoes) and tuberous roots (turnips, &c.), Asters, many weeds, &c., and do considerable damage. In spring, the larvæ become pupæ in earthen cocoons; and in summer, the moths emerge. Plants suffer most from the larvæ in ungenial summers, when growth is slow; and the damage then done permanently injures them. Rains occasionally enable plants to recover, even when they have suffered severely. Further information about these larvæ will be found under **Noctua**; and the best remedies are mentioned under that heading.

SUSARIUM. A synonym of **Symphyostemon** (which *see*).

SUTHERLANDIA (named in honour of James Sutherland, Superintendent of the Royal Botanic Garden at Edinburgh; he published, in 1683, "Hortus Medicus Edinburgensis"). ORD. *Leguminosæ*. A monotypic genus. The species is a canescent, half-hardy shrub, very handsome when in flower. It succeeds best in a compost of loam and peat; and may be readily increased by seeds, or by young cuttings.

S. frutescens (shrubby).* Bladder Senna of the Cape. *fl.* scarlet or bright red, handsome, in axillary racemes; calyx five-toothed; standard oblong, shorter than the boat-shaped keel; wings very short. June. *fr.* a curious, papery, inflated, many-seeded pod. *l.* impari-pinnate; leaflets numerous, elliptic or oblong, entire, exstipellate; stipules small, narrow. *h.* about 3ft. South Africa, 1683. (B. M. 181, under name of *Colutea frutescens*.)

S. f. microphylla (small-leaved). *fl.* two or three to a peduncle. *l.*, leaflets oblong-linear, glabrous above, pubescent beneath. 1816.

SUTRINA (said to be the native name in Peru). ORD. *Orchideæ*. A monotypic genus. The species—a dwarf, stove, epiphytal orchid, with scattered-racemose, medium-sized flowers, an erect, simple scape, coriaceous leaves, and a very short, one or two-sheathed stem—is a native of Peru, and is unknown to cultivation.

SUTTONIA (named in honour of the Rev. Dr. Sutton, 1756-1846, an English botanist). ORD. *Myrsineæ*. A small genus of greenhouse, evergreen shrubs or small trees, natives of New Zealand and the Sandwich Islands. *Suttonia* is now included, by Bentham and Hooker, under *Myrsine*; it only differs in having its petals free as far as the base, and its stigma sub-sessile. The only

Suttonia—*continued.*

species calling for mention here is *S. australis*. For culture, *see* **Ardisia.**

S. australis (Southern). *fl.* minute, in capitate, lateral fascicles. *l.* lin. to 1½in. long, oblong or obovate, obtuse, coriaceous, undulated, much-veined, studded with rounded, pellucid glands. *h.* 8ft. to 10ft. New Zealand. A perfectly glabrous shrub, with its bark nearly black. Its proper name, according to Hooker, is *Myrsine Urvillei*.

SUTURE. The line of junction of two different parts. Sutural dehiscence is the act of splitting along the line of junction of two valves.

SWAINSONA (named in honour of Isaac Swainson, F.R.S., a celebrated cultivator of plants, about the end of the last century, at Twickenham). Including *Cyclogyne*. ORD. *Leguminosæ*. A genus comprising about twenty-three species of very elegant, greenhouse herbs or sub-shrubs; one is a native of New Zealand, and the rest are Australian. Flowers bluish-violet, purple, red, rarely white or yellow, disposed in axillary, often pedunculate racemes; calyx teeth sub-equal, or the two upper ones shorter; standard orbicular or reniform, spreading or reflexed; wings oblong, falcate or slightly twisted, often shorter than the broad, incurved keel; bracts membranous, usually narrow or small. Pods ovoid or oblong, turgid or inflated. Leaves impari-pinnate; leaflets numerous, entire, exstipellate; stipules usually herbaceous, rarely bristly. The species best known to cultivators are described below. They are all Australian, and well deserve a place in every greenhouse, thriving in a mixture of sandy loam and peat. Propagation may be readily effected by young cuttings, inserted in sand, under a glass; or by seeds.

S. atrococcinea (dark scarlet). Probably a garden name for a form of *S. galegifolia*.

S. canescens (hoary). *fl.* blue or violet-purple, variegated with pink, and with a green blotch at the base of the standard, nearly sessile; calyx silky-hairy; keel much curved; racemes many-flowered, on long, silky-villous peduncles. May. *l.*, leaflets nine to fifteen, obovate or oblong-elliptic, obtuse or retuse, ¼in. to 1in. long, nearly glabrous above, softly pubescent beneath. Stock woody, with erect, but herbaceous, stems, 1ft. to 2ft. high. (P. M. B. vii. 199, under name of *Cyclogyne canescens*.)

S. coronillæfolia (Coronilla-leaved). A form of *S. galegifolia*.

S. galegifolia (Galega-leaved).* *fl.* deep red, rather large; standard having prominent callosities above the claw; racemes pedunculate, exceeding the leaves, and sometimes twice as long. July. *l.*, leaflets eleven to twenty-one, or rarely more, oblong, obtuse or emarginate, mostly ½in. to ¾in. long. 1800. A glabrous perennial or sub-shrub, with erect, flexuous branches, 1ft. high, or sometimes climbing to several feet. (J. J. F. 304, under name of *S. Osbornii*; A. B. R. 319, under name of *Vicia galegifolia*; B. M. 792, under name of *Colutea galegifolia*.) *S. albiflora* (B. R. 994; L. B. C. 1642) is a form with white flowers, and *S. coronillæfolia* (B. M. 1725) has light purplish-pink flowers. The plants in gardens under names of *S. atrococcinea*, *S. magnifica*, and *S. purpurea* are probably forms of this species.

S. Greyana (Grey's).* Darling River or Poison Pea. *fl.* pink, large, in long, erect, pedunculate racemes; calyx densely cottony-white, longer than the pedicels; standard ¾in. in diameter. July. *l.*, leaflets eleven to twenty-one, oblong, obtuse or retuse, ¾in. to 1in., or sometimes 1½in., long. Stems erect or ascending, 2ft. to 3ft. high. 1844. Perennial herb or sub-shrub. (B. M. 4416; B. R. 1846, 66.)

S. lessertiifolia (Lessertia-leaved). *fl.* violet-purple, rather small, in short racemes, sometimes reduced to umbels or heads, on peduncles longer than the leaves; standard without callosities. July. *l.*, leaflets nine to fifteen, or rarely more, oblong, obtuse, mucronate, or almost acute, ¼in. to 1in. long. Stems diffuse or ascending, 1ft. to 1½ft. high. 1824. Perennial herb.

S. magnifica (magnificent), of gardens. Probably a form of *S. galegifolia*.

S. occidentalis (Western). *fl.* purple, numerous, in long, pedunculate racemes; calyx sparsely hairy; standard ¼in. broad, but not so long. Summer. *l.*, leaflets eleven to seventeen, or occasionally more, oblong, obtuse, or acute, ¼in. to nearly 1in. long. Stems usually erect, and bent in zigzag form at the nodes. *h.* 2ft. to 3ft. A glabrous or pubescent perennial. (B. M. 5490.)

S. procumbens (procumbent). *fl.* violet or blue, large and fragrant, disposed in a loose raceme, on a peduncle often attaining 1ft.; standard about 1in. long, deeply emarginate, without callosities; keel much incurved. Summer. *l.*, leaflets eleven to

Swainsona—*continued.*

twenty-one or more, varying from oblong or almost linear, and ¼in. to ½in. long, to lanceolate or linear, acute, and upwards of 1in. long. Stems procumbent, ascending, or erect. 1862. Perennial herb. SYN. *S. violacea.*

S. purpurea (purple), of gardens. Probably a form of *S. galegifolia.*

S. violacea (violet). A synonym of *S. procumbens.*

SWALLOW-WORT. *See* **Asclepias** and **Chelidonium.**

SWAMMERDAMIA. Now included under *Helichrysum.*

SWAMP DOGWOOD. A common name for **Ptelea trifoliata** (which *see*).

SWAMP HICKORY. A popular name for **Carya amara** (which *see*).

SWAMP ROSE-MALLOW. A common name for *Hibiscus Moscheutos.*

SWAMP SAXIFRAGE. *See* **Saxifraga pennsylvanica.**

SWAMP WHITE OAK. *See* **Quercus bicolor.**

SWAN-NECK, or **SWANWORT.** *See* **Cycnoches.**

SWAN-RIVER DAISY. A common name for **Brachycome** (which *see*).

SWARTZIA (named in honour of Olaf Swartz, M.D., of Stockholm, 1760-1818, a long time resident in the West Indies, author of "Flora Indiæ Occidentalis"). ORD. *Leguminosæ.* A genus comprising nearly sixty species of unarmed, stove trees; one is a native of tropical Africa, and the rest inhabit tropical America. Flowers racemose, or one to a peduncle; calyx firmly closed, but ultimately splitting; corolla sometimes wanting, when present consisting of only one petal (standard), or rarely two or three; stamens indefinite. Pods ovoid or elongated, turgid or sub-terete. Leaves imparipinnate or one-foliolate. Only two species call for description here. They should be grown in a mixture of sandy loam and peat. Cuttings, with the leaves intact, will root in sand, under a glass, in heat.

S. grandiflora (large-flowered). *fl.* yellow, three to five in a corymb, the one petal 1in. or more in diameter. June. *l.*, leaflet single, 3in. to 5in. long, elliptic-oblong, with a bluntish point, glabrous, undulated; petioles short. *h.* 6ft. West Indies, 1821. SYN. *S. simplicifolia.*

S. pinnata (pinnate-leaved). *fl.* yellowish, the one petal roundish, glabrous, half as long again as the calyx; pedicels fascicled; racemes elongated, tomentose-pubescent, longer than the calyx. June. *l.*, leaflets five, 6in. to 12in. long, elliptic-oblong, pointed, glabrous. *h.* 6ft. West Indies, 1817.

S. simplicifolia (simple-leaved). A synonym of *S. grandiflora.*

SWEDISH JUNIPER. *See* **Juniperus communis fastigiata.**

SWEET ACORN OAK. *See* **Quercus Ballota.**

SWEET ALYSSUM. *See* **Kœniga maritima.**

SWEET AMBER. *See* **Hypericum Androsæmum.**

SWEET BASIL. *See* **Basil, Sweet.**

SWEET BAY-TREE. *See* **Laurus nobilis.**

SWEETBRIAR. *See* **Rosa rubiginosa.**

SWEET BROOM. *See* **Scoparia dulcis.**

SWEET CALABASH. *See* **Passiflora maliformis.**

SWEET CASSAVA. *See* **Manihot Aipi.**

SWEET CHESTNUT. *See* **Castanea sativa.**

SWEET CICELY (*Myrrhis odorata*). A hardy perennial, native of Southern Europe, sparingly cultivated for the use of its leaves in salads, &c. It grows almost anywhere, and may be increased by seeds, sown in autumn, or by divisions. The leaves have a strong flavour of aniseed.

SWEET FLAG OR SEDGE. *See* **Acorus Calamus.**

SWEET GALE, or **SWEET WILLOW.** *See* **Myrica Gale.**

SWEET GUM. *See* **Liquidambar styraciflua.**

SWEET LIME. *See* **Citrus Limetta.**

SWEET ORANGE. *See* **Citrus Aurantium.**

SWEET PEA. *See* **Lathyrus odoratus.**

SWEET POTATO. *See* **Batatas edulis.**

SWEET SCABIOUS. *See* **Scabiosa atropurpurea.**

SWEET-SCENTED CRAB. *See* **Pyrus coronaria.**

SWEET-SCENTED VERBENA. *See* **Lippia citriodora.**

SWEET SOP. The fruit of **Anona squamosa** (which *see*).

SWEET SULTAN. A common name for several species of *Centaurea.*

SWEET WILLIAM. *See* **Dianthus barbatus.**

SWERTIA (named after Iman. Swert, a famous cultivator of bulbs, &c., in Holland, author of "Florilegium," 1612). Felwort. SYNS. *Agathotes, Henricea, Monobothrium, Ophelia.* ORD. *Gentianeæ.* A genus comprising about forty species of greenhouse or hardy, erect, annual or perennial herbs, inhabiting Europe, Asia, and Africa, mostly in mountainous regions. Flowers blue, rarely yellow, clustered, cymose, or loosely pedicellate, disposed in racemiform, thyrsoid, or loosely corymbose panicles; calyx four or five-parted; corolla rotate, with a very short tube, the lobes twisted to the right; stamens four or five, affixed at the base of the corolla. Leaves opposite, or in the perennial species radical, on long petioles; cauline ones occasionally alternate. The species described below are—with the exception of *S. perennis*—all Indian annuals. Seeds should be sown on a hotbed, and the seedlings, when frosts are well over, transplanted where they are intended to remain. *S. perennis* was once reported as having been found growing wild in Wales, but this has never been confirmed.

S. alata (winged). *fl.* lurid green-yellow, veined with purple, four-parted, in large panicles; corolla lobes often shorter than the calyx. Summer. *l.*, cauline ones sub-sessile, ovate, acute. Stem four-angled, often four-winged. *h.* 1ft. to 2ft. 1868. (B. M. 5687, fig. 12, under name of *Ophelia alata.*)

S. angustifolia (narrow-leaved). *fl.* usually white, dotted with blue or black; sepals often longer than the corolla. Summer. *l.* narrow-lanceolate, narrowed at base. *h.* 1ft. to 2ft. 1868. (B. M. 5687, figs. 3, 4, under name of *Ophelia angustifolia.*)

S. corymbosa (corymbose).* *fl.* pale blue, or white with blue nerves; cymes forming a level-topped corymb. May. *l.*, lower cauline ones ¾in. long, spathulate-obovate, obtuse, slightly petioled; upper ones sessile, ovate or oblong, ½in. long, subacute. Stem 8in. to 20in. high, quadrangular or four-winged. 1836. (B. M. 4489, under name of *Ophelia corymbosa.*)

S. paniculata (panicled).* *fl.*, sepals oblong, acute; corolla lobes white above, with two purple or lurid-green marks at base; panicle branched. Summer. *l.* oblong or lanceolate. *h.* 1ft. 1868. (B. M. 5687, figs. 5, 6, under name of *Ophelia paniculata.*)

S. perennis (perennial). Marsh Felwort. *fl.* erect; corolla blue, with dark spots, the segments elliptic-oblong and slightly acute. July. *l.*, lower ones oblong-elliptic, on long petioles; cauline ones opposite, ovate-oblong, somewhat obtuse. Stem ascending, many-flowered. *h.* 9in. Europe. Hardy perennial, requiring a moist, half-boggy position. (F. D. 2047; R. G. 1885, 274.)

Swertia—*continued.*

S. purpurascens (purplish). *fl.* purple or dark red; sepals oblong; corolla lobes ¼in. long, ovate, much reflexed; panicles divaricate, many-flowered, leafy. June. *l.* oblong or lanceolate, 1½in. long, narrowed at base; the lowest ones nearly obtuse, the uppermost ones acute, glabrous. Stems 8in. to 3ft. high. 1840.

S. trichotoma (trichotomous). *fl.* white; corolla lobes often caudate; pedicels ⅛in. to 1¼in. long, numerous, umbelled or clustered at the ends of the cyme branches. Summer. *l.*, upper cauline ones elliptic-lanceolate. *h.* 1ft. to 1½ft. 1863. This is closely allied to *S. corymbosa.* (B. M. 5397, under name of *Ophelia umbellata.*)

SWIETENIA (named in honour of Gerard von Swieten, 1700-1772, a Dutch botanist and author). ORD. *Meliaceæ.* A monotypic genus. The species is a tall, stove tree, with fuscous-red wood—well known as Mahogany, and extensively employed in the manufacture of furniture, &c. *S. Mahagoni* thrives in a compost of loam and sand. It may be increased by ripened cuttings, with the leaves intact, inserted in sand, under a hand-glass, in heat.

S. Mahagoni. Mahogany-tree. *fl.* reddish-yellow, small, in axillary and sub-terminal panicles; calyx five-cleft; petals five, imbricated. May. *l.* abruptly pinnate, highly glabrous; leaflets opposite, petiolulate, oblique, ovate, long-acuminate. *h.* 70ft. Central America and the Antilles, 1734.

SWIFT MOTHS. *See* **Otter Moth.**

SWISS STONE PINE. *See* **Pinus Cembra.**

SWORD LILY. A common name for *Gladiolus.*

SYAGRUS (the old Greek name of a Palm, mentioned by Pliny). ORD. *Palmæ.* A small genus of stove, unarmed Palms, now included, by Bentham and Hooker, under *Cocos.* Flower-spike enveloped in a double spathe. Shell of the fruit hard and bony, having a broad, smooth band or channel running from each of the three pores, and meeting at the top; seed oily, sometimes hollow, inclosed in a hard, bony shell, surrounded by a fibrous rind. Leaves terminal, pinnatisect. For culture, *see* **Cocos.**

S. amara (bitter). *fl.*, inner leaflets of the males linear-oblong; females ovate-globose. *fr.* ovoid-oblong, blunt at both ends, 3in. long. *l.*, segments linear, acuminate. Trunk 50ft. to 100ft. or more in height. Jamaica. In habit this species closely resembles *Cocos nucifera.*

S. botryophora (cluster-bearing). *fl.*, spathe secund, as long as the spadix, sulcate; spadix 1½ft. or more long. *l.* erecto-patent, 9ft. to 10ft. long; pinnæ opposite or grouped, 1½ft. to 2ft. long, linear, acuminate, obliquely adnate, slightly crisped. Trunk straight, 50ft. to 60ft. high, 6in. to 10in. thick. Bahia, 1836. SYN. *Attalea grandis.*

S. campestris (field-loving).* *fl.*, spathe as long as the spadix; spadix 1½ft. long, spreading when flowering, nodding in fruit. *l.* spreading, 2ft. to 6ft. or more long; pinnæ 1½ft. to 2ft. long, not more than ½in. broad; petioles broadly sheathing and very thick, clothed at the edges with woody, brown fibres, and armed with a few stout, dark reddish-brown spines on the naked portion. Trunk swollen at base. Brazil. An elegant and highly ornamental plant.

S. cocoides (Cocos-like).* *fl.* yellowish-white, rather large; outer spathe 1ft. long, obtuse, navicular, ferruginous-tomentose outside, within at first yellowish-white, at length fuscous; inner spathe, together with the compressed-terete peduncle, 1½ft. long; spadix slightly and simply branched, drooping, 1½ft. long, nodding or pendulous, and 2ft. long when fruiting. *l.* all terminal, rather loose, erecto-patent, arcuate, tufted, 4ft. to 6ft. long, pinnate; pinnæ linear, narrow, slightly curled, the adults 9in. to 12in. long, linear-lanceolate, acuminate, highly glabrous. Trunk 8ft. to 10ft. high, 2in. to 3in. thick. Brazil, 1823.

S. comosa (tufted). *fl.*, spathe fusiform, sulcate; spadix 1ft. or more long, with five, six, or numerous flexuous branches. *fr.* fibry, oblong or ovate-oblong, glabrous. *l.* 3ft. to 4ft. long, spreading; pinnæ erect, approximate, lanceolate, obliquely adnate. Trunk 10ft. or rarely more in height, annulate below. Brazil.

S. Mikaniana (Mikan's). *fl.*, spadix 2ft. to 3ft. long. *fr.* about 2in. long. *l.* dense, slightly crisped, 8ft. to 10ft. long; pinnæ linear-lanceolate, acuminate. Trunk 40ft. to 50ft. high, nearly 1ft. thick, irregularly annulate. Brazil, 1853.

S. Sancona (Sancona). *fl.*, outer spathe smaller; inner one fusiform, 3ft. long, opening at back; spadix simply branched; inflorescence monœcious, axillary. *fr.* orange, ovoid, glabrous, smooth. *l.* 8ft. long, reticulate and sheathing at base, spreading; leaflets about 180 on each side, aggregate in threes, fours, or fives, linear, acute, glabrous, papyraceous, 2ft. long, 2in. broad. Trunk 60ft. to 80ft. high, 6in. thick. Brazil.

SYCAMINE-TREE. A Scriptural name for the Mulberry-tree. *See* **Morus.**

SYCAMORE-TREE. *See* **Acer Pseudo-platanus.** The name is also applied to *Platanus occidentalis* and other species.

SYCHINIUM. A synonym of *Dorstenia.*

SYCOMORE FIG-TREE. *See* **Sycomorus antiquorum** (the proper name of which is now *Ficus Sycomorus*).

SYCOMORUS (the old Greek name used by Dioscorides; from *sycos*, a fig, and *moros*, a mulberry). ORD. *Urticaceæ.* A genus comprising nearly a score species of stove or greenhouse trees, confined to the Old World, now included, by the authors of the "Genera Plantarum," under *Ficus.* Male flowers sessile, the perianth three or rarely two-parted; females sessile or pedicellate, the perianth three or many-parted. Leaves alternate, rounded-cordate or oblong, entire or serrated, glabrous, puberulous, or rough. Only a couple of species call for description here. They thrive in sandy loam, with the addition of a little leaf soil, and only small pots, in comparison to the size of plant, need be used. Plenty of syringing, or occasional sponging, will keep the leaves clean, and almost any amount of water may be applied to the roots. The plants are readily propagated by cuttings or eyes, having a leaf attached, inserted in a close frame, inside a propagating house, in early spring.

S. antiquorum (ancients'). Pharaoh's Fig; Sycomore Fig-tree. *fl.* greenish or yellowish, racemose, pedunculate. *l.* ovate, obtuse, cordate at base, four or five-ribbed on both sides, entire, repand, or slightly angular, at length nearly glabrous and smooth; petioles and branchlets slightly hairy. Egypt. SYN. *Ficus Sycomorus.*

S. capensis (Cape). *l.* ovate or ovate-oblong, attenuated and slightly obtuse at apex, rounded or sub-emarginate and entire at base, the rest deeply dentate-serrate, glabrous, smooth, three or four times as long as the petioles. Cape of Good Hope, 1816.

SYKESIA. A synonym of **Gærtnera** (which *see*).

SYLVESTRIS. Growing in woods.

SYMEA. A synonym of **Solaria** (which *see*).

SYMMETRICAL. Regular as to the number of parts or as to shape: *e.g.*, a flower with five sepals, five petals, and five, ten, or fifteen stamens.

SYMPETALOUS. The same as **Monopetalous** (which *see*).

SYMPHACHNE. A synonym of **Eriocaulon** (which *see*).

SYMPHORIA. A synonym of **Symphoricarpus** (which *see*).

SYMPHORICARPUS (from *symphoreo*, to bear together, and *karpos*, fruit; in allusion to the clusters of berries). St. Peter's Wort; Snowberry-tree. SYN. *Symphoria.* ORD. *Caprifoliaceæ.* A genus comprising about half-a-dozen species of handsome, dwarf, hardy, deciduous shrubs, natives of North America and the mountains of Mexico. Flowers white or pink, small, disposed in short, axillary racemes or spikes; calyx tube sub-globose, the limb somewhat irregularly four or five-toothed; corolla funnel-shaped or campanulate, the limb four or five-lobed; stamens four or five. Drupes white or red, baccate, ovoid or globose, fleshy, four-stoned. Leaves opposite, shortly petiolate, ovate, entire or, on young plants, sinuate-toothed. Four of the species have been introduced. They are of very simple culture in

Symphoricarpus—*continued.*

ordinary garden soil, and may be readily increased by suckers, which are thrown up in abundance. The flowers of *S. racemosus* are much sought after by bees; and its fruits form excellent food for game.

S. microphyllus (small-leaved). *fl.* white, axillary, solitary. August. *l.* roundish-ovate, slightly obtuse, pubescent. *h.* 4ft. Mexico, 1829. (B. M. 4975.) SYN. *S. montanus* (B. i. 20).

Symphoricarpus—*continued.*

July to September. *fr.* white, large, persistent through a great part of the winter. *l.* glaucous beneath. *h.* 4ft. to 6ft. North America, 1817. (B. M. 2211 and L. B. C. 230, under name of *Symphoria racemosus.*)

S. r. pauciflorus (few-flowered). *fl.*, spike reduced to one or two flowers in the axils of the uppermost leaves. *l.* about 1in. long.

S. vulgaris (common). Coral Berry; Indian Currant; Common

FIG. 557. UPPER PORTION OF PLANT OF SYMPHYTUM ASPERRIMUM.

S. montanus (mountain-loving). A synonym of *S. microphyllus.*

S. occidentalis (Western).* Wolf Berry. *fl.* white, tinged with rose-colour, larger and more funnel-shaped than in *S. racemosus*, in dense, terminal and axillary spikes; corolla much bearded within; stamens and style protruded. Summer. *fr.* white. *l.* oval, shortly petiolate, downy beneath, entire, or wavy-toothed or lobed on the young shoots. North America.

S. racemosus (racemose-flowered).* Common Snow Berry. *fl.* rose-coloured, in loose and somewhat leafy, interrupted spikes at the ends of the branches; corolla bearded inside. St. John's Wort. *fl.* red and yellow, small, in small, close clusters in the axils of all the leaves; corolla sparingly bearded. July to September. *fr.* dark red, the size of hemp-seed. *l.* elliptic-ovate, obtuse, glaucous, pubescent beneath. *h.* 3ft. to 6ft. North America, 1730. In the form *foliis variegatis* the leaves are finely variegated with green and yellow.

SYMPHYANDRA (from *symphio*, to grow together, and *aner, andros*, an anther; the anthers are connate). ORD. *Campanulaceæ.* A genus comprising seven species

Symphyandra—*continued.*

of hardy, perennial herbs, natives of the Orient, distinguished from *Campanula* in having connate anthers. Flowers white, yellow (or blue), often nodding, rather large, racemose or loosely paniculate, five-parted; inflorescence centrifugal. Leaves broad, often cordate, toothed; radical ones on long petioles; cauline ones alternate, few or small. Three species have been introduced. A rather rich sandy loam, with plenty of drainage, suits these plants. They are propagated by division of the roots, or by young cuttings, in spring; also by seeds.

S. Armena (Armena). *fl.* blue, terminal, solitary, erect; calyx hoary, with triangular segments; corolla tubular, velvety. June. *l.* ovate, acute, deeply serrated, velvety-hoary. *h.* 2ft. 1836.

S. pendula (pendulous). *fl.* cream-colour, paniculate; calyx lobes lanceolate; corolla funnel-shaped, velvety. July. *l.* ovate, acute, crenate-toothed, velvety. Stem branched, pendulous, somewhat woody, pilose. *h.* 2ft. 1823. (S. B. F. G. ser. ii. 66.)

S. Wanneri (Wanner's).* *fl.* blue; calyx lobes acuminate, one-half shorter than the tubular-campanulate corolla; peduncles one-flowered, axillary and terminal. Summer. *l.* lanceolate, unequally toothed, villous-pubescent, the lower ones petiolate. Stems erect, 6in. high, terete, striated, pubescent. Alps. SYN. *Campanula Wanneri.*

SYMPHYOGLOSSUM. A synonym of **Cynanchum** (which *see*).

SYMPHYOSTEMON (from *symphyo*, to unite, and *stemon*, a stamen; the filaments are connate at base, in a cylindrical tube). SYNS. *Psithyrisma*, *Susarium*. ORD. *Irideæ*. A small genus (two or three species) of greenhouse or half-hardy plants, with fibrous roots, natives of extra-tropical South America or the Andes. Flowers several in a spathe, pedicellate; perianth yellow, whitish, or purple-striped, the tube rather long, funnel-shaped, the lobes sub-equal and erecto-patent; stamens affixed to the throat; scape sometimes very short, sometimes very tall and leafless, or with one floral leaf. Leaves radical, linear, clustered. *S. narcissoides*, the only species introduced, thrives in a compost of sandy loam and leaf mould. Propagation may be effected by seeds, or by offsets, in spring.

S. narcissoides (Narcissus-like). *fl.* dirty-white, veined with brownish-purple, very fragrant, nodding, on short stalks, funnel-shaped; spathe consisting of bracts, membranous at the margin, of which the lowermost is sharper than the others. June. *l.* very narrow, glaucous, subulate at apex. Stem 1ft. to 1½ft. high. South coasts of South America, 1828. SYN. *Sisyrinchium odoratissimum* (B. R. 1283).

SYMPHYOSTEMONOUS. With united stamens.

SYMPHYSIS. A term signifying a growing together.

SYMPHYTUM (the old Greek name used by Dioscorides, and derived from *symphuo*, I make to grow together; from its supposed power of healing wounds). Comfrey. ORD. *Borragineæ*. A genus comprising about seventeen species of hardy, erect, sometimes tuberous herbs, natives of Europe, North Africa, and Western Asia. Flowers yellowish, blue, or purplish, pedicellate, cymose or racemose; calyx five-cleft or five-parted, the segments linear; corolla broadly tubular, enlarged above, with five scales in the throat; lobes five, very short, erect and tooth-like or scarcely spreading; stamens five, affixed to the middle of the tube. Nutlets four, ovoid, smooth. Leaves alternate or mostly radical; cauline ones sometimes decurrent; uppermost ones sometimes closely approximate and nearly opposite. *S. officinale* is a well-known plant which has become rather widely naturalised along our water-courses; it has much the taste and properties of Borage. The species described below are showy subjects,

Symphytum—*continued.*

thriving in almost any soil or situation. They succeed under the shade of trees, and flower throughout the principal part of the summer. Propagation may be effected by divisions.

S. asperrimum (very rough). Prickly Comfrey; Trottles. *fl.* bluish-purple; corolla campanulate, four times as long as the calyx. *l.* ovate-lanceolate, very acute at both ends, scabrid; lower ones petiolate; uppermost ones sub-sessile. Stem branched, strigosely bristly. *h.* 4ft. Caucasus, 1799. See Fig. 557. The variety *aureo-variegatum* has the leaves bordered with yellow.

S. bohemicum (Bohemian). A synonym of *S. officinale bohemicum.*

S. caucasicum (Caucasian).* *fl.* blue; corolla sometimes thrice as long as the obtusely five-toothed calyx, the limb campanulate. *l.* ovate-lanceolate, hairy; lower ones attenuated into long petioles; upper ones nearly opposite, shortly decurrent at the sides of the stem. *h.* 3ft. Caucasus, 1820. (B. M. 3188.)

S. Donii (Don's). *fl.* blue; calyx lobes subulate, scabrid; corolla tube equalling the calyx, the limb campanulate, with linear, obtuse appendages. *l.* scabrid; lower ones ovate-lanceolate, attenuated into the petioles; upper ones lanceolate, narrow, decurrent at the sides of the stem. *h.* 2ft. (S. B. F. G. ser. ii. 294, under name of *S. caucasicum.*)

S. officinale (officinal). Alum; Black Root; Common Comfrey; Knitback, &c. *fl.* creamy-yellow, drooping, in scorpioid cymes; calyx lobes narrow-lanceolate; corolla ¾in. long. *l.* ovate-lanceolate; radical ones 4in. to 8in. long, on long, winged petioles; cauline ones shortly petiolate. Stem 1ft. to 3ft. high, branched. Europe (Britain), &c. (Sy. En. B. 1115.)

S. o. bohemicum (Bohemian).* *fl.* red or reddish-purple; racemes twin, erect, revolute at apex. *l.* running into the petioles. Bohemia, 1810. (S. B. F. G. ser. ii. 304.) SYN. *S. bohemicum.*

FIG. 558. SYMPHYTUM OFFICINALE LUTEO-MARGINATUM.

S. o. luteo-marginatum (yellow-margined). A variety having the leaves margined with yellow. 1870. See Fig. 558. SYN. *S. o. variegatum.*

S. o. patens (spreading). A purple-flowered form. (Sy. En. B. 1116.)

S. o. variegatum (variegated). A synonym of *S. o. luteo-marginatum.*

S. orientale (Oriental). *fl.* whitish; corolla twice as long as the five-toothed calyx, funnel-shaped above, with linear-attenuated appendages. *l.* oblong-ovate, acute, narrowed at base; lower ones alternate, petiolate, sub-cordate; uppermost ones nearly opposite, sessile. Stem branched. *h.* 3ft. Orient, 1752. Plant clustered, pubescent.

S. o. angustior (narrowed). *l.* oblong- or oval-lanceolate, undulated. (B. M. 1912, under name of *S. orientale.*)

S. peregrinum (foreign). *fl.* reddish and purplish; calyx five-parted nearly to the base, the segments acuminate; corolla three or four times longer than the calyx, sub-campanulate above the middle, shortly five-cleft. *l.*, lower ones on long petioles, elliptic-lanceolate, acuminate; upper ones sessile. Stem tall, branched. Iberia, &c., 1816. See Fig. 559. (B. M. 6466.) This species is largely cultivated as a fodder plant, under the erroneous name of *S. asperrimum.* By some authors it is regarded as a hybrid between *S. asperrimum* and *S. officinale.*

Symphytum—*continued.*

S. tauricum (Taurian). *fl.* whitish; calyx acutely lobed above the middle; corolla twice as long as the calyx, with obtuse lobes and linear appendages. *l.* acute, slightly undulated; lower ones alternate, petiolate, ovate-cordate; uppermost ones opposite, sessile. Stem branched. *h.* 3ft. Tauria, 1806. Plant pilose, hairy. (B. M. 1787.)

FIG. 559. INFLORESCENCE OF SYMPHYTUM PEREGRINUM.

S. tuberosum (tuberous-rooted).* *fl.* ochreous. *l.* scarcely decurrent; radical ones on long petioles. Stem 1ft. to 2ft. high. Rootstock short, horizontal. Europe (Britain). This resembles *S. officinale*, but the flowers are smaller, and the radical leaves are on longer petioles. (J. F. A. 225; Sy. En. B. 1117.)

SYMPIEZA (from *sympiezo*, to press; in reference to the stamens, which adhere to the corolla tube). ORD. *Ericaceæ*. A small genus (five species) of small, Heath-like, greenhouse shrubs, confined to South Africa. Flowers small, clustered in terminal heads, ebracteate or tribracteate; calyx rather thick, complanate and bilabiate or tubular-campanulate and four-toothed; corolla marcescent, oblique or curved, with a shortly-bifid limb, the lobes broad and connivent; stamens four, exserted. Leaves ternately whorled, small or minute, linear or elliptic, sulcate at back. *S. capitellata*, the only species introduced to our gardens, is a pretty little shrub, thriving in a compost of turfy peat and sand. It may be increased by young cuttings, inserted in sand, under a glass.

S. capitellata (small-headed). *fl.* pink, in sub-globose, drooping heads; corolla thrice as long as the shortly-ciliated, compressed, bilobed calyx. July. *l.* linear-trigonal or erecto-incurved; floral ones scarcely longer than the calyx. *h.* 1½ft. 1812.

SYMPLOCARPUS (from *symploke*, connection, and *karpos*, fruit; alluding to the coalescence of the ovaries into a compound fruit). SYNS. *Ictodes*, *Spathyema*. ORD. *Aroideæ* (*Araceæ*). A monotypic genus. The species is a large, robust, hardy, aquatic perennial,

Symplocarpus—*continued.*

having a similar fœtid odour to that of the skunk. It succeeds in a marshy situation, preferring peat soil. Increased by divisions.

S. fœtidus (fœtid). Meadow or Skunk Cabbage, &c. *fl.* all fertile; spathe spotted and striped with purple and yellowish-green, ventricose or conchoid, curved at apex, thickly coriaceous, persistent; spadix violet, included, globular, short-stalked, entirely covered with thickly-crowded flowers; peduncle very short. May. *l.* 1ft. to 2ft. long, ample, ovate-cordate, acute, thickly coriaceous, with thick nerves; petioles short, robust, long-sheathing. Rootstock descending. *h.* 1ft. America, North-eastern Asia, and Japan. (B. M. 3224.) SYN. *Pothos fœtidus* (B. M. 836).

SYMPLOCOS (from *symploke*, a connection; the stamens are united at the base). Including *Hopea*. ORD. *Styraceæ*. A large genus (about 150 species) of stove or greenhouse, usually glabrous, rarely pubescent or villous, trees and shrubs, broadly dispersed over the warmer parts of Asia, Australia, and America. Calyx five-lobed, imbricated; corolla lobes or segments five and one-seriate, or six to ten and biseriate, free or more or less connate; stamens often numerous, many-seriate; racemes or spikes axillary, loose or dense, sometimes reduced to few-flowered fascicles or even to single flowers. Leaves alternate, coriaceous or membranous. The five species introduced thrive in a compost of loam, peat, and sand. Propagation may be effected by cuttings, inserted in sand, under a glass (those of *S. coccinea* and *S. Sumuntia* in heat).

S. coccinea (scarlet). *fl.* red, axillary, solitary, sessile, 1in. broad; corolla ten-lobed, spreading; petals nearly connate at base. May. *l.* elliptic-oblong, 3in. to 4in. long, acuminate, obtuse at base, crenulated, glabrous above, pilose beneath; petioles ¼in. long. *h.* 10ft. Mexico, 1825. Stove tree.

S. cratægoides (Cratægus-like). *fl.* white, small; panicles 1in. to 5in. long, cymosely many-flowered. April. *l.* 2½in. by 1in. to 1¼in., varying from lanceolate and acuminate to broadly obovate-elliptic and nearly obtuse, closely serrated towards the apex. *h.* 3ft. to 40ft. Himalaya and Japan, 1824. Greenhouse shrub or tree.

S. japonica (Japanese). *fl.* pale yellow, sub-sessile; racemes axillary, simple, shorter than the petioles, three to five-flowered. June. *l.* oblong- or obovate-elliptic, 2in. long, acute at both ends, glabrous, serrated; petioles ¼in. long. *h.* 10ft. Japan, 1850. Greenhouse tree. (S. Z. F. J. 24, under name of *S. lucida*.)

S. sinica (Chinese). *fl.* white, fragrant; racemes compound, terminal and axillary, as long as the leaves. May. *l.* elliptic, 1¼in. to 2in. long, acute at both ends, serrated, and, as well as the branches and branchlets, pubescent. *h.* 3ft. China, 1822. Greenhouse shrub. (B. R. 710.)

S. Sumuntia (Sumuntia). *fl.* whitish, small, produced in short, few-flowered spikes. Summer. *l.* narrowly elliptic, acute, serrulate, cuneate at base. Himalaya, 1883. An unattractive, stove shrub. (R. G. 1073, fig. c-g.)

S. tinctoria (dyer's). Horse Sugar; Sweet Leaf. *fl.* yellow, odorous, six to fourteen in close and bracted clusters. April. *l.* elongated-oblong, 3in. to 5in. long, acute, obscurely toothed, thickish, almost persistent, minutely pubescent and pale beneath. *h.* 3ft. South United States, 1780. Greenhouse shrub. The leaves are sweet, and are greedily eaten by cattle; after drying, they are used for dyeing yellow.

SYMPODE, SYMPODIUM. "A stem made up of a series of superposed branches in a way to imitate a simple axis; a Sympodial stem" (Asa Gray).

SYN. A term which, in Greek compounds, signifies union, adhesion, or growing together: *e.g.*, Synantherous, stamens coalescent by their anthers; Syncarpous, composed of two or more united carpels.

SYNADENIUM (from *syn*, united, and *aden*, a gland; the glands of the involucre are united in a cup or disk). African Milk-bush. ORD. *Euphorbiaceæ*. A small genus (two or three species) of slightly fleshy, terete-branched, stove shrubs, natives of South and tropical East Africa. Flowers rather inconspicuous, in terminal, loosely corymbose, bi- or trichotomously-branched, cymes; involucre campanulate, regular, five-lobed, five-glanded, seated on a flat-concave cupule; males (on separate cymes) from twenty to thirty in five fascicles; females

Synadenium—*continued.*

solitary, with bifid, recurved stigmas. Leaves scattered, obovate, entire, rather thick. Only one species has been introduced. It thrives in a thoroughly well-drained, sandy loam, with the addition of a little well-rotted cow-dung. Propagation may be effected by cuttings, thoroughly dried at the base, inserted in sand, and occasionally very slightly moistened.

S. Grantii (Captain Grant's). *fl.* red-purple; involucre ¼in. in diameter; pedicels purplish; cymes axillary, corymbosely branched, 6in. to 8in. long, green; bracts appressed. November. *l.* 3in. to 4in. long, obtuse, not very succulent, dark green above, paler below. Stem stout, terete. *h.* 6ft. to 10ft. Central Africa, 1867. (B. M. 5633.)

SYNANDRA (from *syn*, together, and *aner*, *andros*, an anther; the posterior and sterile anthers are connate). ORD. *Labiatæ*. A monotypic genus. The species is a hardy, hairy, fibrous-rooted biennial, with the habit of *Lamium*, and requiring ordinary culture.

S. grandiflora (large-flowered). *fl.* white or nearly so, solitary in the bracts; corolla 1½in. long; filaments bearded. June. *l.* membranous, cordate, coarsely crenate, all but the floral ones (which are reduced to ovate, sessile bracts) long-petioled. *h.* 1ft. to 2ft. North America, 1827.

SYNANDRA (of Schrader). A synonym of *Aphelandra*.

SYNANTHEREÆ. Synonymous with *Compositæ*.

SYNAPHLEBIUM. Included under *Davallia* and *Lindsaya*.

SYNARRHENA. A synonym of **Mimusops** (which *see*).

SYNCARPIUM. A multiple fruit, as the Mulberry; or a fleshy, aggregate fruit, like that of *Magnolia*.

SYNECHANTHUS (from *syneches*, continuous, and *anthos*, a flower; in allusion to the arrangement of the inflorescence). SYNS. *Rathea*, *Reineckia*. ORD. *Palmæ*. A small genus, consisting of two Central American and one Columbian species of gregarious, unarmed, stove Palms. Flowers greenish or the males purplish, minute; spathes many, tubular, membranous, persistent; spadices many, on long and slender peduncles, erect in flowering, with straight, compressed or ancipitous branches. Fruit reddish-yellow, shining, ellipsoid, one-seeded. Leaves terminal, equally pinnatisect; segments broad or narrow, membranous, acuminate, plicate-nerved, often interrupted, the margins recurved at base; rachis convex at back, deeply keeled above; petioles channelled above; sheaths short, opening. Trunk slender, annulate, often stoloniferous. *S. fibrosus*, the only species introduced, is an exceedingly graceful Palm, requiring similar treatment to **Chamædorea** (which *see*).

S. fibrosus (fibrous-rooted).* *fl.* in two-ranked, short, linear clusters; spathes several; spadices one-third as long as the leaves, the branches many, very slender, forked. *fr.* orange-red, sessile, 1in. to 1¼in. long. *l.* 4ft. long, erect and spreading; leaflets numerous, 1ft. to 1½ft. long, spreading and rather pendulous, linear-lanceolate. Trunk 4ft. high, green. Central America. (B. M. 6572.)

SYNEDRAL. Growing on the angles of a stem.

SYNGENESIA. A Linnean class, characterised by having Syngenesious anthers.

SYNGENESIOUS. Having the anthers united at their edges, so as to form a tube.

SYNGONIUM (from *syn*, confluent, and *gone*, the womb; alluding to the cohesion of the ovaries). ORD. *Aroideæ* (*Araceæ*). A genus comprising about eight species of stove, climbing shrubs, natives of tropical America. Flowers monœcious, the males and females remote; spathe tube ovoid, accrescent, persistent, the throat contracted, the lamina boat-shaped, at length deciduous; spadix inappendiculate, much shorter than the

Syngonium—*continued.*

spathe; peduncles fascicled or solitary, short. Leaves petiolate; primary ones sagittate; adults pedately three to nine-cut; petioles elongated; sheaths persistent, accrescent. The species introduced are described below They are easily grown in a house where a high temperature and a moist atmosphere are maintained. An open compost of loam and peat, or leaf mould, to which some coarse sand should be added, is best; the plants are not, however, very fastidious regarding soil. Plenty of water and frequent syringings are essential in the summer or growing season; and no more shade should be applied than is requisite to keep the leaves from scorching. Propagated easily by dividing the stems into lengths consisting of about three joints, and inserting them in pots, in a brisk heat. These soon become established, and make new growth at the top. Any old plants which get too high for the house they occupy may have their tops cut off and inserted as large cuttings: these soon re-establish themselves.

S. affine (related). *fl.*, spathe green, the lamina yellowish within; peduncles very numerous, two to seven from one axil, slender, nearly equalling the spathe. *l.* acute; anterior lobes oblong-triangular; posterior ones trisected, sub-auriculate or auriculate; petioles twice or thrice as long as the leaves, sheathed above the middle. Brazil. SYN. *S. gracile*.

S. auritum (eared). Five Fingers. *fl.*, spathe tube purplish, cylindrical, the lamina ovate-oblong, shortly cuspidate, purplish at throat, the rest yellow; peduncles short. *l.* three or nearly five-cut; middle segment largest, broadly ovate-oblong, rounded and shortly cuneate towards the base; lateral segments inequilateral, falcate-oblong, auriculate. Branches green. Jamaica.

S. gracile (slender). A synonym of *S. affine*.

S. podophyllum albo-lineatum (foot-leaved, white-lined). *fl.*, spathe tube oblong-ovoid, the lamina cuspidulate; peduncles many. *l.* at first sagittate; adults consisting of five to seven distant, oblong-lanceolate, acute segments; midrib and lateral nerves whitish; petioles elongated. Central America. SYN. *S. Seemanni*.

S. Seemanni (Seemann's). A synonym of *S. podophyllum albo-lineatum*.

S. Vellozianum (Velloz'). *fl.*, spathe tube green, ovate, acuminate, the limb pale yellowish-green outside, whitish-green within; peduncles many, rather long, slender. *l.* at first rather broadly sagittate; petioles scarcely longer than the blade, sheathed above the middle. Young branches slender. Rio de Janeiro. *S. Reidelianum* is a form of this species with an oblong spathe tube, and shorter peduncles.

S. Wendlandii (Wendland's). *fl.*, spathe tube rather shorter than the oblong-lanceolate, cuspidate-acuminate lamina; spadix one-sixth shorter than the spathe; peduncle equalling the spathe tube. *l.* rather longer than the petioles, trisected, the segments oblong-lanceolate; young leaves sagittato. Caudex ascending; internodes green. Costa Rica.

SYNGRAMME. Included under *Gymnogramme*.

SYNNETIA. *See* **Synnotia.**

SYNNOTIA (named in honour of W. Sŷnnot, who collected many plants at the Cape of Good Hope). Erroneously spelt *Synnetia*. ORD. *Irideæ*. A small genus (three species) of pretty, greenhouse, bulbous plants, natives of South Africa. Flowers rather large, sessile; perianth funnel-shaped, with erecto-patent, unequal lobes; stamens affixed at base of throat; spathes scattered at the sides of the stem, rather broad, cut or fimbriate-toothed at apex, one-flowered. Leaves few, flat, linear-ensiform, flaccid. Stem simple or very slightly branched. Propagation is readily effected by seeds; or by offsets, which are freely produced. Seeds should be sown in pans of sandy soil, about September, and placed in a cool frame. The young plants may remain in the seed-pans for the first year, when they should be either potted singly or planted out. Three or four years elapse before they flower. Propagation by offsets is a much quicker method, as the plants then generally flower the second year. Synnotias, cultivated as pot plants, are adapted for conservatory and cool greenhouse decoration, in spring. The bulbs should be potted rather firmly, in sandy loam and leaf soil, during October, placing about six or eight in a 5in. pot, and covering

Synnotia—*continued.*

them with 1in. of soil. The pots may then be plunged or stood on ashes in a cool frame, and but little water will be required throughout the winter. When the flowers appear, more water may be given, and the plants fully exposed to light and plenty of air: draughts, however, must be avoided. After flowering, growth and a gradual ripening should be encouraged, by keeping the plants watered for a time. When the leaves die away, the bulbs may be shaken out and stored in bags until the autumn, or they may be allowed to remain in the soil and be kept dry.

S. bicolor (two-coloured). *fl.* alternate, distant: perianth violet and yellow, the tube curved, the segments ovate; spathe ⅝in. long; scape erect, 6in. to 10in. high, simple or branched, leafy. March. *l.* distichous, striated, acute, ⅝in. broad. 1786. (B. H. ii. 25; B. M. 548, under name of *Ixia bicolor*.)

S. galeata (helmeted). *fl.*, perianth ringent, the three lower segments yellowish, the others white tinged with red. *l.* ovate-ensiform.

FIG. 560. FLOWERING BRANCH OF LILAC CHARLES X.

S. variegata (variegated).* *fl* alternate, distant; perianth yellow and violet, the tube elongated, 1¼in. long, the uppermost segment erect, the two lateral ones recurved; scape terete, simple, 1½ft. high. May. *l.* ovate-lanceolate-ensiform, the lower ones distichous, the upper ones alternate. 1825. (S. B. F. G. 150.)

SYNONYM. In botany, a superseded or unused name.

SYNSEPALOUS. The same as **Gamosepalous** (which *see*).

SYRINGA (from *syrin*, *syringos*, a pipe; the branches are long and straight, and are filled with medulla). Lilac; Pipe-tree. Including *Ligustrina*. ORD. *Oleaceæ*. A well-known genus, comprising about ten species of ornamental, hardy, deciduous, glabrous or pubescent shrubs, natives of Eastern Europe and temperate Asia. Flowers disposed in terminal, thyrsoid or trichotomous panicles, the inflorescence at first centripetal, ultimately often centrifugal; calyx campanulate, irregularly toothed; corolla tube cylindrical, rarely shortened; lobes four, shorter or longer than the tube, induplicate-valvate; stamens two, affixed nearly at the apex of the tube, the filaments short or filiform. Leaves opposite, entire or rarely pinnatisect. Nearly all the species, and many splendid varieties, have been introduced to our gardens. The common English name is said to have been derived from *Lilac* or *Lilag*, the Persian word for the flowers. The common Lilac, *S. vulgaris*, and its varieties, are the largest in the genus, and are also among the commonest and most beautiful of our spring-flowering shrubs.

Syringa—*continued.*

Propagation. Lilacs may be readily increased by suckers, which are produced in abundance from the roots. Scarce or good varieties may be increased by means of shield-budding, using a pushing bud in April, or a dormant one in July. Crown-grafting or cleft-grafting in March is also practicable, either on stocks near the ground, or on others prepared as dwarf or tall standards. Seedling plants should be raised for stocks, as they are less likely to produce suckers, which would, in due course, deprive the bud or graft of its full amount of nutriment. Strong-growing varieties are usually worked near the ground, and the new shoot allowed to run up; others, of slender growth, are best united higher up on a more vigorous stock. The varieties may also be raised from cuttings.

Cultivation. Few shrubs are more universally grown and admired when in flower than the species and varieties of *Syringa*. They grow freely, and flower profusely outside in almost any soil and situation, but well repay any extra attention bestowed in removing suckers or giving a little good soil occasionally. They are also amongst the best of subjects for forcing in winter and early spring. One of the finest varieties for this latter purpose is Charles X. (see Fig. 560): its panicles of flowers are much larger and more compact than the so-called Persian Lilac of gardens (*S. chinensis*), which is, however, well adapted for treating in a similar way. In France, Lilacs are extensively forced in places where light is excluded. The flowers thus become, by blanching, pure white, and are in great request in the flower market for making bouquets, &c.; large quantities being sent annually to England, amongst other places. The common Lilac (*S. vulgaris*) is also amenable to blanching. It has been recently discovered that, if forced in a sufficiently heated structure, the colouring matter has no time to form in the flowers, and therefore the same results are obtained as if the plant were, according to the old recognised method, grown in a place where light was excluded.

Lilac flowers, when blanched pure white, have a very chaste and beautiful appearance. The process of blanching is best performed in a cellar or shed, from which all light can be excluded. A temperature of 55deg. or 60deg., with a moist atmosphere, should be maintained, and it should preferably be secured by fermenting material composed of stable litter and leaves. One disadvantage connected with blanching is the impossibility of obtaining any foliage to accompany the flowers. Leaves procured from other plants exposed to light may, however, be substituted.

Forcing. Lilac plants intended for forcing are best prepared by being grown purposely in pots; at any rate, they should be lifted and potted early in autumn, using any ordinary loamy soil, and afterwards standing

Syringa – *continued.*

them outside until required. Only those with plenty of flower-buds should be selected for forcing. The difference in flower and wood-buds is not always readily seen, as both are on the points of the shoots. Flower-buds are globose, and much more plump than the others, and may thus be distinguished. Light protecting material should be placed round the pots for the winter, and a few plants, as may be required, introduced to the forcing house at intervals of two or three weeks from November onwards. A moist temperature of 55deg. will be sufficient at first, as it is important that the flowers should be induced to start a little in advance of the leaves. When Lilacs are placed direct into a high temperature, growth is unduly excited, and the flowers often remain dormant, and eventually die away instead of opening. When flowering is over, the growths may be cut back to within 2in. of the starting point of the previous year. Lilacs do not answer well for forcing two years in succession; consequently, two

FIG. 561. FLOWERING BRANCH OF SYRINGA CHINENSIS.

batches should be kept, one to remain in the ground outside while the other is being forced. Where expense is not an object, beautiful plants may be purchased annually. They are imported from the Continent in large quantities, both as dwarfs and standards, and are all invariably well set with flower buds.

Fungi. Few Fungi ever do conspicuous harm to plants of this genus, and none are known to be really dangerous to their welfare. The only ones that call for even a passing reference are those that grow on the living leaves. These organs are occasionally more or less covered with a diffused white coat of hyphæ of **Oidium** (which *see* for remedies). Other plants show a dark coating of *Fumago vagans*, so widely diffused on almost all shrubby plants, especially when growing under trees infested by Aphides. Well syringing the leaves with clean water, or with soapsuds, will remove honeydew, which serves as the food of the Fungus, and will also clear away the Fungus itself. In the North of

Syringa—*continued.*

Scotland, the leaves of Lilacs often show brown patches, with a green, watery border. These patches are the work of a Fungus, discovered by Mr. A. S. Wilson, and named by Mr. Berkeley *Ovularia Syringæ* (G. C., 19th Oct., 1881). Hyphæ are pushed out through the stomata of the leaves, and each bears on the tip a pear-shaped spore, fixed by the broader end. Mr. W. G. Smith has described the sexual spores of this Fungus. They are formed on the decaying, fallen leaves. The best remedy is to gather and burn such leaves in autumn. The leaves of Lilacs are apt to be disfigured by dry spots, the work of various Fungi, *e.g.*, *Asteroma vagans*, *Cercospora Lilacis*, *Phyllosticta Syringæ*, *Septoria*

FIG. 562. FLOWERING BRANCH OF SYRINGA EMODI.

Syringæ, &c.; but it would be useless to enter into a description of these so-called species, as they are only stages in the development of others, probably *Pyrenomycetes*, not yet ascertained; and the effects are much alike with all of them. A few of these have not yet been recorded as British. The Lilacs seem little the worse for their presence. Probably, burning the fallen leaves would be found sufficient to prevent the disfigurement from spreading.

Insects. Insect pests are not dangerous. They are chiefly the larvæ of a few Moths; *e.g.*, the Privet Hawk-moth (*see* **Sphingidæ**), one or two *Noctuæ* and Geometers, and one of the *Tincina*, named *Gracilaria syringella*. The last-mentioned causes the most conspicuous damage, as it

Syringa—*continued.*

is very common. Its larva burrows in the leaves, and forms an irregular mine, ending in a pale blotch. After a time, it leaves the mine, and rolls up the leaf into a tube for its own protection, till full-fed, when it drops to the soil, and becomes a pupa below ground. The moth is about ½in. in spread of wings: these are yellowish-white, with a basal patch, a blotch on the inner margin, and three oblique bars (all brown). The leaves should be picked off while the larvæ are in them, and may be crushed or burned. The larvæ of the other Moths are all much larger than the *Gracilaria*. They may be exterminated by shaking the bushes over anything placed below, to receive the insects as they fall.

FIG. 563. FLOWERING BRANCH AND LEAF OF SYRINGA JAPONICA.

S. amurensis (Amur). A synonym of *S. japonica*.

S. chinensis (Chinese). Rouen Lilac. *fl.* of an intense violet colour; corolla limb flat. May and June. *l.*, including the petioles, six to seven lines long, ovate-lanceolate, slightly acute at the base, acuminate at apex, highly glabrous. *h.* 4ft. 1795. This plant varies somewhat in the colour of its flowers. It is regarded by some authors as a hybrid between *S. persica* and *S. vulgaris*. See Fig. 561. SYNS. *S. dubia*, *S. rothomagensis*.

S. dubia (doubtful). "Persian Lilac." Erroneously called *S. persica* in gardens. A synonym of *S. chinensis*.

S. Emodi (Mount Emodus).* *fl.* purplish or white, often fascicled; corolla tube ½in. long, lobes ¼in. long; panicles dense-flowered. April. *l.* 3½in. long, 1¾in. broad, elliptic or ovate, acute at

Syringa—*continued.*

both ends, glabrous; secondary nerves prominently reticulated beneath; petioles ½in. to ¾in. long. *h.* 6ft. Himalayas, 1840. See Fig. 562. (B. R. xxxi. 6.)

S. E. variegata (variegated). This differs from the type in having the leaves blotched with dull yellow.

S. japonica (Japanese). *fl.* creamy-white, in a dense-flowered thyrse. Summer. *l.* broad-ovate, acuminate, with a rounded or sub-cuneate base, glabrate above; midrib and veins pubescent beneath. Japan, &c. A handsome shrub. See Fig. 563. (G. C. n. s., xxv. 561.) SYNS. *S. amurensis*, *Ligustrina amurensis*.

S. Josikæa (Countess von Josika's).* *fl.* bluish-purple, scentless; corolla limb slightly concave; pedicel not exceeding the calyx. May. *l.* elliptic-lanceolate, acute, wrinkled, slightly ciliated, glabrous, intense green and shining above, whitish beneath; petioles of the upper leaves two to three lines long. *h.* 5ft. to 10ft. Hungary, 1835. (B. 24; B. M. 3278; B. R. 1733.)

S. oblata (oblate). *fl.* purple, profusely produced in very ornamental bunches; cup of the calyx more acutely four-toothed than in the common Lilac. May. *l.* very striking, large, rather fleshy, oblately cordate. China, 1859. About the size of the English Lilac, but more tree-like in general outline. There is a white-flowered variety.

S. persica (Persian). *fl.* bluish-purple or white, the limb rather flat. May and June. *l.* lanceolate, acute, highly glabrous, sometimes parted or pinnatifid. *h.* 4ft. to 5ft. Persia, 1640. The smallest species of the genus.

S. p. integrifolia (entire-leaved). *l.* all undivided. (B. M. 486, under name of *S. persica.*)

FIG. 564. BRANCH, IN FRUIT, OF SYRINGA PERSICA LACINIATA.

S. p. laciniata (torn). *l.* all, or nearly all, inciso-pinnatifid. See Fig. 564. (L. B. C. 1107.)

S. rothomagensis (Rouen). A synonym of *S. dubia*.

S. villosa (villous). *fl.* bluish-purple; corolla-tube slender, the limb with oblong, reflexed lobes. May. *l.* ovate or ovate-elliptic,

Syringa—*continued.*

rather obtuse, glabrous above, pilose on the principal nerves beneath. *h.* 3ft. to 6ft. North China, 1880.

S. vulgaris (common).* Common Lilac: Pipe-tree. *fl.* red, blue, or white; corolla limb slightly concave. May. *l.* cordate or ovate-cordate, highly glabrous. *h.* 8ft. to 20ft. or more. Persia, Hungary, &c., 1597. Many beautiful varieties, of which the following are a selection, are referred to this species.

S. v. alba (white).* *fl.* white; thyrse ample, clustered. Branches and buds greenish. *h.* 12ft. to 15ft. There are two sub-varieties: *major*, with larger, and *plena*, with double, flowers.

S. v. cærulea (blue). *fl.* slightly rosy, at length becoming blue; thyrse sparingly clustered. *h.* 12ft. A sub-variety has the leaves imperfectly variegated.

S. v. grandiflora (large-flowered). *fl.* red, large.

S. v. purpurea (purple). *fl.* violet-purple; thyrse ample, crowded. Branches and buds purplish.

S. v. violacea (violet). Scotch Lilac. *fl.* of a beautiful violet or lilac; thyrse sparingly clustered. Branches and buds purplish. *h.* 10ft. (B. M. 183.)

GARDEN VARIETIES. A select list of garden varieties is given below:

ALBA GRANDIFLORA, flowers white, large, one of the best; ALBA MAGNA, one of the finest whites; ALBA VIRGINALIS, flowers snowy-white, trusses large, good for forcing; ALPHONSE LAVALLEE, flowers sky-blue, shaded with violet, double, in very large trusses; CHARLES X., flowers deep purplish-lilac when grown outside, white when forced, very large trusses, extra fine, one of the best for forcing; DR. LINDLEY, flowers reddish-lilac, in extremely large clusters; LE GAULOIS, flowers dark peach-colour, with light centres, very double, in large, close trusses; LEMOINEI, flowers pale ashy-lilac, double; MATHIEU DE DOMBASLE, flowers reddish-mauve, double, trusses nearly 1ft. long; MICHEL BUCHNER, flowers pale lilac, rose-margined, double, in fine, erect, pyramidal trusses; RANUNCULIFLORA, flowers dark red, becoming lilac, double; RENONCULE, flowers azure-mauve, strongly perfumed, double, very full; RUBELLA PLENA, flowers vinous-red, changing to rosy-violet, double.

SYRINGA, MOCK. A common name for **Philadelphus coronarius** (which *see*).

SYRINGODEA (from *syriggodes*, fistular; in reference to the slender perianth tube). ORD. *Irideæ*. A small, South African genus (three species) of pretty, dwarf, greenhouse herbs. Flower solitary in the spathe, sub-sessile or shortly pedicellate; perianth salver or funnel-shaped, with a long and very slender tube and sub-equal, spreading lobes; stamens affixed to the throat; spathes sub-sessile within the leaves, narrow, hyaline. Leaves filiform. Only the typical species, *S. pulchella*, has been introduced. For culture, *see* **Ixia.**

S. pulchella (rather pretty). *fl.*, perianth tube cylindrical, 1½in. to 2in. long, thickened above; limb pale purple, the segments

Syringodea—*continued.*

obovate-cuneate, deeply emarginate; spathe valves lanceolate, ½in. to ¾in. long. Autumn. *l.* four to six, setaceous, falcate, glabrous, 3in. to 4in. long. Bulb globose, thick, one-flowered. South Africa, 1873. A very pretty plant. (B. M. 6072; F. d. S. 2096.)

SYRINGODEA (of Don). Included under *Erica.*

SYRPHUS. A genus of two-winged flies (*Diptera*) popularly known as "Hawkflies," because of their rapid, darting flight. They are partial to settling on flowers; and most of them are conspicuous because of the bright spots of yellow, and the metallic greens and other hues, that they bear. They mostly vary in size between a common Housefly and a Bluebottle Fly; and some of them are a good deal the same shape as the latter insect. Hawkflies are mostly smooth-bodied; but, in several genera allied closely to *Syrphus* (*e.g.*, *Volucella*), the species are hairy, and some look much like small Humble-bees. There are numerous species in the genus *Syrphus*, a good many of which are British. The larvæ are of much assistance to gardeners, by destroying the Aphides, or Green-flies. The larvæ of the various species are much alike; all of them are fleshy, and taper from the hinder end to the pointed anterior part, in which is situated the mouth. The body is ringed, and the larva moves very much as a leech does, by contracting and lengthening its body. The female fly lays her eggs on twigs infested by Aphides. The larvæ, so soon as hatched, begin to feed on these insects, seizing them one by one, holding each in the air till sucked dry, and then seizing and sucking another. When full-fed, the larvæ fix themselves by the tails, by means of a cement, to twigs of the plants, and, usually in a few days, the flies emerge. They should not be injured by gardeners, but should be protected as far as possible.

SYSTREPHIA. A synonym of **Ceropegia** (which *see*).

SYZYGIUM. Included under **Eugenia** (which *see*).

SZOWITZIA (named after M. Szovitz, a Hungarian botanist and traveller, who died in 1831). ORD. *Umbelliferæ*. A monotypic genus. The species is a slender, hardy, glabrous, annual herb, native of the South Caucasus region. It has slender, compound umbels of white flowers, and ternate, dissected leaves. Having little beauty, it is probably lost to cultivation.

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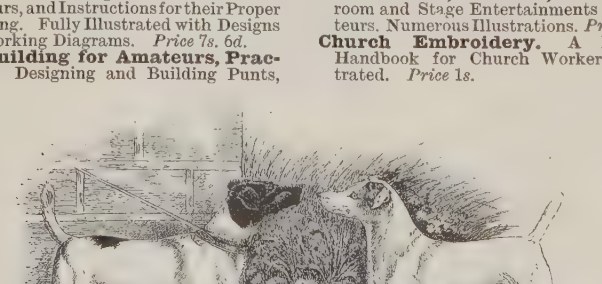

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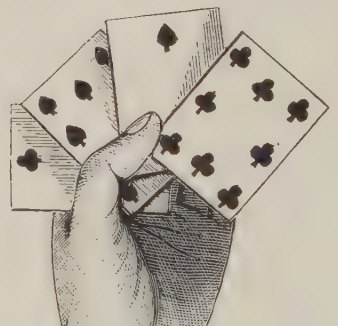

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